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VOL. XXXIX.

1 APRIL, 1933.

PART 4.

Event and Comment.

A Motto for Queensland Producers.

“COMPETITION throughout the world is getting keener every day, and the Queensland producers’ aim should be to produce something better than the other man. They can do it, and there is no reason why they should not do it; our motto in this State should always be, “‘Queensland is never satisfied with anything but the best.’” Those sentiments, expressed by His Excellency the Governor, Sir Leslie Orme Wilson, at the opening of the Toowoomba Show, will be applauded by every Queenslander who has faith in himself and in the future of the land he lives in. In continuing his remarks the Governor stressed the need for improvement in breeding stock and preparing primary produce, and referred to the necessity for care in grading fruit for export. The fruit produced from the Granite Belt was equal to the best in the world, and every endeavour should be made to see that it arrived on the tables of Great Britain in the same condition that it left the trees.

He was a firm believer in the future of Queensland, but it had to be borne in mind that this State had not yet attained the high ideals of perfection. There was something still to be done, and it could be done. Exhibitions were playing a very important part in improving the qualities of the State’s primary products.

The Future of the Sugar Industry.

ADDRESSING sugar technologists in the course of their annual conference at Ayr last month, the Minister for Agriculture and Stock, Mr. Frank W. Bulcock, expressed the view that the time had now come when Queensland would have to alter its policy and extend it to provide more safeguards to an industry of such vital importance as sugar. The Minister said that the sugar technologists played an important part in the industry. People were turning from the field to the mill, and from the mill to the laboratory, to find how their difficulties might be overcome.

If a history of agriculture in Queensland were written the most valuable chapter would be the extension in Queensland of the sugar industry. It was unfortunate that a wider conception of the industry did not exist in the South. In the last few years the industry had sustained a severe blow, and most growers would turn to the technical adviser for help. The technologists had been paying close attention to the economic side, and there was distinct evidence that the sugar industry was doing all it could to overcome its difficulties.

He referred to the good work of officers of the sugar branch of the Agricultural Department, particularly the late Mr. H. T. Easterby. He believed that the two most important questions for the industry at present were combating disease and breeding the right types of cane. The recommendations which the conference made would receive the consideration of his department. It was also his belief that it would be necessary to utilise the services of the trained men to a greater extent in the future.

The Butter Position.

THE present position of the dairy industry is regarded so seriously that the Queensland Butter Board and Council of Agriculture have called a conference of Commonwealth dairy-producing interests in Sydney on 21st April. In the course of a joint statement both bodies express concern that apparently there is to be no result from the Melbourne conference in January, since when the downward trend in prices has continued. In a statement on the subject issued by the Butter Board in February, it was shown that the net values to the Queensland factories for all butter had fallen from 175s. per cwt. in January, 1929, to 92s. 4d. (estimated) for January, 1933, the difference representing an annual loss to the dairy farmers of the Commonwealth to 30th June, 1933, of approximately £14,500,000, or a falling-off in values of nearly 50 per cent. The annual loss per dairy farmer would work out at £120. As the estimated figure for January would not be realised the loss would be greater.

Much of this decline might be regarded as unavoidable, but there were other factors which might by organisation be mitigated or obviated—namely, that portion of the fall in values due to extra keen competition on the British market, and the existing system of price fixation in the Commonwealth on the basis of London values. The industry could not expect any great measure of relief whilst such heavy supplies were available in Britain, but there was ample scope for an endeavour to bridge the gap at present obtaining between the values for Australian and Danish butter. The system at present in operation under which every fall in Britain was registered throughout the Commonwealth could undoubtedly be obviated, and it was to this that they considered the immediate attention of the industry should be directed.

At the commencement of October, 1932, the price of Australian butter in London was 106s. per cwt. To-day it was 72s., representing a fall of over 30 per cent., and under the present system there had been a corresponding fall throughout the Commonwealth. The purchasing power of the consumers of the Commonwealth, however, had not fallen nearly 30 per cent. within the past six months.

A further conference is now regarded as vitally necessary for the purpose of evolving some scheme promising the industry speedy and permanent relief.

Pasture Improvement Below the Border.

GR EAT enthusiasm is being displayed in pasture improvement work in the New England district, according to Mr. L. P. Dutton, the well-known Hereford breeder of Urandangie, Guyra. This, he said in the course of a recent Press statement ("S. M. Herald," 28th March), was shown by the large area now sown to artificial pasture, and the volume of sowing this autumn. Unfortunately, conditions were now very dry, causing some concern to those who had already sown their grasses and retarding the efforts of intending planters.

Urandangie, Mr. Dutton mentioned, was a property of about 7,300 acres, of which over 1,000 acres were now under improved pastures. The main native grasses of the district were wallaby, kangaroo, tussocky poa, and red grass, but these were not to be compared with the sown areas, which had a 100 per cent. greater carrying capacity. The old land was thoroughly prepared for sowing, by ploughing, and then following for twelve months, followed by another ploughing and working prior to seeding. The mixture generally used on the heavy basaltic clays was *Phalaris tuberosa* 2 lb., and perennial rye 8 lb. Black medic at the rate of 2 lb. per acre was included in the mixture when sowing on some of the very heavy patches of soil. Cocksfoot was utilised on the lighter formations, as was the Wimmera rye-sub. clover combination—a mixture which proved very profitable on suitable areas. The great value of improved pastures in the district was in providing winter and early spring feed when the native grasses were furnishing little palatable fodder. In addition to their hardiness and ability to withstand heavy stocking, the capacity of the sown pastures to top off fattening cattle and sheep was most marked.

Boys for the Land.

WITH co-operation of religious organisations and support from other bodies, the Minister for Labour and Industry (Hon. M. P. Hynes) hopes to be able to place a thousand city youths on farms in the course of the current year. Mr. Hynes expressed pleasure recently that leaders of every denomination had signified their interest in the rural training scheme approved by the Government and their willingness to co-operate.

All the Church representatives who had seen him had expressed sympathy with the movement to transfer boys from the city to the country. Personally, he thought that many of the boys, if given an opportunity to appreciate the healthy life of the country, would become landminded and would prove valuable settlers. He had high hopes for the success of the training plan that he had outlined recently, and as 1,000 boys had been placed under a similar scheme in Western Australia within the past year he could see no reason why Queensland should not at least do as well as that.

Mr. Hynes emphasised that present employees on farms would have to be protected against displacement by learners, and the farmers who took the boys would be required to give an undertaking not to use them to displace other labour at present employed in rural industry.

Dairying Expansion in Tropical Queensland.

THE Minister said he was particularly interested in the expansion of the dairying industry in the North. Three outstanding instances of the pioneering were found at Daintree, Silkwood, and Mackay. Butter factories had been established in each centre. The Daintree factory was of particular interest, because it was probably the only butter factory that operated so far into the tropical area in any country in the world, and an excellent grade of butter was being made. The Atherton Tableland was a unique tract of agricultural country. The problem of the grass growth was serious, and it was the intention of the department to undertake a more specific investigation in this direction at an early date.

Opportunity was taken by Mr. Bulcock in the course of his tour to meet departmental officers and to visit experimental farms. Among the farms visited by the Minister and the party were the former banana experimental station at Bartle Frere, the Johnstone River Sugar Experimental Station, the Kairi State Farm, and the Mackay Sugar Experimental Station. The position of all these stations would be reviewed in the near future, as it was his intention to make an effort to obtain co-ordination to a greater extent among the various departmental agricultural activities in the North.

Bureau of Sugar Experiment Stations.

CANE PEST COMBAT AND CONTROL.

COMPLETE DESTRUCTION OF CANE STOOLS CAUSED BY GRUBS OF THE GREYBACK COCKCHAFER.

By EDMUND JARVIS.

It is proposed to publish each month a short paper describing the movements of this insect, either above or below ground, according to the time of the year; together with descriptive details of a nature calculated to assist canegrowers in the study of this pest in every stage of its life cycle. Mr. Jarvis's entomological notes are always interesting, and this additional monthly contribution will be welcomed by our readers who are engaged in the sugar industry.—EDITOR.

PREDOMINANCE AND MAXIMUM ACTIVITY OF THIRD-STAGE GRUBS OF OUR CANE BEETLE. Srd

THE widely spread damage caused by this formidable insect pest is, perhaps, best seen from the windows of a railway carriage while travelling through or close to grub-infested localities—such as occur, for instance, alongside the Kuranda line between Redlynch and Jungara, or, while journeying to Babinda, between Gordonvale and Deeral.

Amongst an otherwise green expanse of cane-leaves one will at once notice at this time of year large patches of several acres in extent of a uniform dark-brown colour, with marginal edges of same contrasting sharply with the surrounding bright green healthy cane. In such affected areas all the stools have been killed outright, the leaves being dry, twisted, and dead.

From five to fifteen or more greyback grubs may be found under a single stool of such cane, giving an average of at least 70,000 per acre. After suffering a mortality of from 5 to 6 per cent., however, from attacks of parasitic and predaceous insect and other enemies, the survivors eventually transform into pupæ, at depths in the ground varying from 12 to 15 inches, and in due course about 64,000 beetles would emerge from each acre of such infested land. Fifty per cent. of these are usually females, capable of producing collectively about 768,000 eggs, from which grubs hatch a week or so later.

With further reference to this interesting question of the numerical increase of our greyback beetle, it may be mentioned that in the Cairns district alone, during the 1914 season, no less than 22 tons of these cockchafers were collected in about three weeks. This amount represented fully 8,400,000 greybacks, which are able, under favourable conditions, to destroy 165,000 tons of sugar-cane.

MOVEMENTS OF FULLY-GROWN GRUBS OF THE GREYBACK.

The following notes are supplementary to those published last month under the heading of "Subterranean Movements of the Mature Grub," but deal more particularly with the final activities of third-stage larvæ just before transformation into the pupal state. During wet weather in March or April, when at times even light well-drained soils become more or less saturated, these grubs will often work up to the surface in order to obtain sufficient air; and in fields where the trash has been left between the rows after harvesting they occasionally come right out of the soil and lie on top of the ground in semi-darkness, hidden more or less by the litter of dead leaves. Indications of maximum injury to cane are often seen towards the end of April, when the fully-fed grubs, having devoured most of the large roots, eat big holes into or gnaw completely through the juicy basal portions of the cane sticks, gradually bringing them one by one to the ground. Under cover of these fallen canes and leaves, which afford ample overhead protection from sunlight, they soon commence to gnaw deeply into the lower surface of canes lying in close contact with the bare earth, usually preferring the soft cellular tissue of the internodes to harder or less succulent portions. (See accompanying plate.)

METHODS OF CONTROLLING CANE GRUBS.

Fumigation of Grub-Infested Cane Land.

This valuable means of control has been fully described. On farms which have been fumigated, all hand-injectors or other apparatus used should now be thoroughly cleaned and overhauled before being put away until next season.

Control Effected by Insectivorous Birds.

Our growers would do well to cultivate a regard for the many species of birds which are helping greatly to thin the ranks of this notorious cane insect, both in its beetle and grub conditions. In these enlightened days, when entomologists are so fond of voicing the merits of biological control, we are, perhaps, inclined to dwell too much on the entomological side of this question, and not enough on the advantages to be derived from a closer study of our insect-eating birds and their habits. We must not forget that the services rendered by birds in helping to maintain what is known as the balance of nature cannot be too highly valued by the man on the land.

Incredible as it may seem, one occasionally hears reports of the shooting of ibis and other grub-eating birds for food. Such foolish slaughter, if continued, must eventually lead to several of these feathered friends avoiding the neighbourhood of canefields and feeding elsewhere. About fifteen years ago it was not unusual to see flocks of the Straw-necked Ibis in canefields around Gordonvale and Highleigh picking up grubs behind the plough, but now only one or two specimens are noticed at work in a field, while in some localities this valuable bird appears to have disappeared altogether. The areas proclaimed as bird sanctuaries which chiefly concern residents around Cairns are:—The Shires of Cairns and Barron, the Bellenden Ker Reserve, Kuranda (Mona Mona Mission), and Lake Barrine Reserve.

Amongst the list of 123 birds which are protected during the whole of the year throughout Queensland, the following render more or less important services in our canefields:—(1) Straw-necked Ibis; (2) White Ibis; (3) Pewee or Mud Lark; (4) Indian Mynah; (5) Leatherhead; (6) Laughing Jackass; (7) Fig Bird; (8) Blue Jay; (9) Australian Bee Eater; (10) Black and White Fantail; (11) Black-faced Cuckoo Shrike; (12) Pallid Cuckoo.

Insect Enemies of Greyback Grubs.

Our two common species of "Digger Wasps" may be considered responsible for a mortality of from 5 to 8 per cent. of second and third stage grubs. Being indigenous insects, however, their increase is effectually controlled by hyper-parasitic enemies, of which the principal are certain flies and a beetle.



PLATE 28.

3. Digger-Wasp Parasite of Cane Grubs.



PLATE 29.

4. Maggot of Parasite sucking cane grub.

Other predaceous enemies helping to check the activities of greyback grubs include two or more species of robber flies and one of click beetles, the larvæ of which attack them in the soil, puncturing and sucking their life juices.

Species of carnivorous ground beetles and ants doubtless destroy a small percentage of these grubs; while during abnormally wet seasons many succumb to the insidious attacks of insect-attacking fungi and bacterial diseases.

In addition to the above-mentioned enemies, the common Bandicoot and other small native marsupials probably account for a minor percentage of grubs, whenever these chance to occur plentifully, or while they are feeding close to the surface, as often happens during very wet weather.

DESCRIPTION OF MATURE GRUB.

After having finished feeding, about the end of April, its body has a somewhat plump look, and instead of being creamy white has now darkened to clayey yellow or old-gold colour, and becomes quite opaque. This change takes place about a week before the grub starts its downward journey into the subsoil in order to construct a pupal cell.

The plate for April illustrates cane sticks which have fallen, after being nearly eaten through by grubs; this may happen as a result of windy weather, or from the canes having been gnawed completely through laterally.

Four third-stage grubs are shown in the act of finishing off the basal portions of canes which still remain in the ground; while another grub is engaged in eating into an internode of a stick resting on the surface soil.

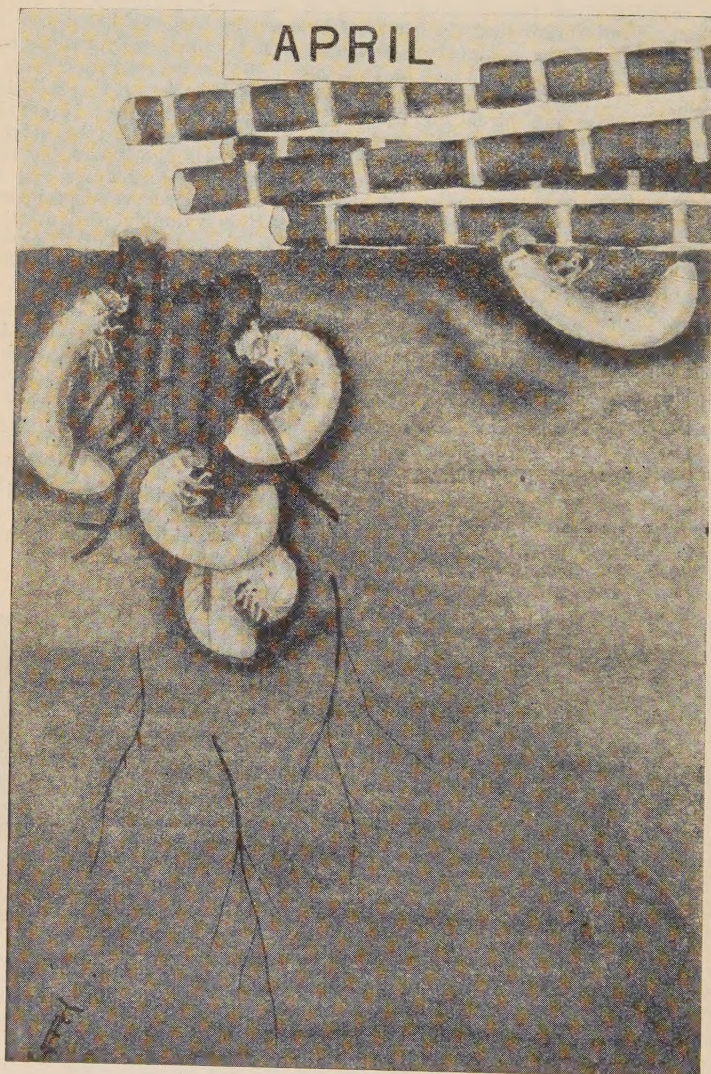


PLATE 30.

Cane sticks gnawed into by greyback grubs begin to blow over during April. Third-stage grubs are seen devouring the remains of sticks left in the soil, and gnawing into prostrate canes.

Caterpillar Plagues in Grasslands and Cultivation Paddocks.

By J. HAROLD SMITH, M.Sc., N.D.A., Entomologist.

IN most dairying districts localised outbreaks of cutworm or Noctuid larvæ are more or less well known to the farmer. Sometimes they may be confined to a small area of some 20 or 30 acres, while occasionally considerable tracts of land may be infested and the growing crops destroyed. During the summer of 1931-32 the Atherton Tableland suffered from coincident outbreaks at scattered centres so far apart as Atherton and Tarzali, Tolga and Butcher's Creek. About the same time reports from the Gympie district, investigated by W. A. T. Summerville, B.Sc., Assistant Entomologist, indicated that a considerable acreage of paspalum had been eaten out by one of the species operating in the North. Previously when such outbreaks have come under the notice of the Department the pest concerned has been *Cirphis unipuncta* Haw., better known as the army worm, and notorious as a pest of pastures and several cultivated crops, including sugar-cane, maize, and sorghum, for its host-plant range is a very wide one. Last year, however, two other species—*Spodoptera exempta* Walk. and *S. mauritia* Boisid.—were implicated, and a brief account of these will summarise the relevant data collected during the present invasion. *S. mauritia* was absent from the Gympie outbreak.

First reports came to hand just before the close of the year 1931, and the affected paddocks were then and for a further two weeks a seething mass of larvæ, sometimes stationary, more often moving as the available food supply was exhausted. Pastures were for the most part affected, perhaps because the main centres of the outbreak lay in essentially dairying belts. At the Atherton end of the Tableland, however, maizegrowing is the principle farming activity, and part of the crop suffered, while the incidence of the pest at the time presaged large-scale losses. Fortunately, the epidemic phase extended over only a single generation, and thereafter the pest ceased to be of any serious consequence.

Most cutworm outbreaks have in the past taken place during the spring and summer months, when growing conditions are good. Were they to happen later in the year the position in pastures would be much more serious, for an early recovery would be exceptional, and the shortage of feed would coincide with a period in the year when the ordinary resources on the farm are already severely taxed. As a rule, however, pastures attacked early in the year rapidly improve and, while the losses may be inconvenient, adjustments in stocking will normally save the situation until such time as feed is again available on the attacked pastures. When the centres of attack are located in the maize belt the position is more difficult, for the nature of the wet season is such that, should a growing crop be destroyed, replanting cannot always be undertaken with any certainty of success. The loss actually depends on the date of the attack. Should this be in December or early January, replanting after an epidemic has subsided may yield a payable crop; but a crop sown at a later date would, perhaps, be best regarded as additional green feed for stock rather than as a source of grain.

Host Plant Relationships.

Among the pasture grasses, *paspalum* (*P. dilatatum*) alone suffered, this being the most widely distributed fodder grass in the affected areas. It is curious that in mixed stands containing Kikuyu grass (*Pennisetum clandestinum*) and *Panicum muticum* both these grasses were passed by and remained unaffected, while seedling trees within the host-plant range also escaped. In the Gympie area *paspalum* suffered most severely, but some loss was also experienced in Rhodes grass paddocks. Normally, cutworms may attack a wide range of host-plants, and the species have been reared successfully in the laboratory on a number of grasses passed over in the field. There can be thus no doubt concerning the generalised tastes of the species of *Spodoptera*, and the explanation of their restriction to a single host probably depends on the nature of the food supplies available during the early life of the pest. Thus, if schooled in early larval life to consume a particular host, the larvæ will exhibit a preference for this so long as it is available. Should the initial host-plant be exterminated, an alternative may serve for the completion of development, but, provided the former exists in readily available supplies, the preference will be clearly exhibited—i.e., so long as the first host-plant is not one on which the pest can only be reared with difficulty.

In pastures the larvæ may consume any part of the flag, and sometimes the whole may be destroyed if the larval population per unit area is high. At a lower level of infestation the stems may be chewed at ground level, and the subsequent collapse of the herbage may actually cause an equivalent loss to the farmer. In such cases the dead grass may be raked together by hand as in pastures subject to grass grub (*Oncopera* sp.) attacks. Both types of injury can be located in any one attack, the second being on the outer edge of the affected area, and the consequence of attack when the epidemic is subsiding.

The injury to maize entirely depends on the age of the crop which is attacked. If the plants are young and succulent they may be eaten to the ground; otherwise, only the flag suffers, and the loss in leaf surface directly affects cobbing, though the measure of the loss varies with the stage reached in that process. Precobbing attacks would thus be more serious than post-cobbing, for the weight and the size of the cob are influenced by the evenness and rate of growth in the precobbing stages.

Field Observations.

By the time field observations were practicable the epidemic was on the wane, and the numbers of larvæ, though considerable, were by no means commensurate with the extent of the pasture losses in the first paddock examined. It was presumed, therefore, that the bulk of the larvæ in the plague generation had pupated, and a search for this stage was accordingly undertaken. Cutworms normally pupate in the soil, and, though odd pupæ were located in the mulch formed by semi-decayed grass, they were too few to represent the main population. Such a mulch was not at all widely spread, for some two years ago the army worm swept through the paddock and effected a very real improvement in its root-bound condition. Hence the upper inch or so of the surface soil was more or less free from accumulated humus. Though pupation may take place in the laboratory under almost any conditions, it was then presumed that in pastures denuded of grass cover and subject to high midday temperatures pupation would only occur under particularly suitable conditions. Such ultimately proved to be the case. Stock had been grazing on the paddock for some time, and eventually the pupæ

were found clustered together in the, as yet, moist dung masses. Often the pupæ were so closely packed together that individual pupal cells adjoined one another, and in many such dung masses larvæ about to pupate were associated with them. As many as fifty pupæ have been recovered from the one dung mass. There can be no doubt, therefore, that these offer especially favourable conditions for pupation, and that the larvæ readily seek them out. There is nothing peculiar in pupation as such, the earth or dung cell being unlined with silk as in most Noctuids.

The duration of the attack was in all recorded cases confined to a single generation; hence it must be presumed that the emerging moths represent a mere fraction of that latent in the previous larval population. Parasites doubtless play a part in effecting this limitation, for a Tachinid accounted for almost half of the pupæ taken in the field and subsequently reared in the laboratory. Curiously enough, few mummified larvæ were found at Gadgarra, though they were said to be common at the Atherton end of the Tableland, where the precipitation is much less. The combined effects of insect parasites and various entomogenous fungi must, therefore, be important in the field of natural control. Perhaps a greater, though less obvious, limitation results from the crowded conditions imposed on larvæ living under epidemic conditions. In the laboratory a single generation of *S. mauritia* was reared from egg masses laid in cages containing mated pairs under observation. Some of the first-stage larvæ were reared singly, others in groups of three or four, while the remainder were housed in large breeding jars. Adequate food supplies were maintained in all cases, yet the number of individuals in the groups, whether large or small, steadily diminished. The causes are not always obvious, but the main factor in these instances must have been cannibalism in some form or other. It may be complete—in which case no trace of the body remains other than the more chitinous structures—or it may be partial, following injuries which ultimately prove fatal to the sufferer. Whichever plays the larger part, there can be no doubt that a plague carries the germ of its own destruction, and that overcrowding, even when food supplies are adequate, plays a considerable part in the decimation of immature forms.

The Nature of Epidemic Conditions.

The explanation of cutworm outbreaks is quite problematical. There seems to be no reasonable doubt that the fundamental cause is one which temporarily breaks down the normal host-parasite relationship and permits the rapid reproduction of the pest at the same time. Individual species possess very different requirements, which limit their distribution, and these are usually typical of their normal habitat. Were it not for seasonal variations, outbreaks would be liable to occur every year, but the necessary sequence of conditions favourable to an epidemic is quite rare; hence the sporadic outbreaks, with a subsequent return to normal numbers, following limitations imposed by the joint influence of parasites and climatic conditions less favourable to rapid multiplication. The temporary nature of the escape from normality is shown in the case of the Queensland pasture species by the fact that only rarely does the epidemic extend beyond a single generation. Though inferences from the climatological data available would be quite unwarranted, a statement of the more obvious features surrounding the outbreak may be worth recording. Mid-December temperatures following the usual pre-wet season storms were exceptionally high, and remained

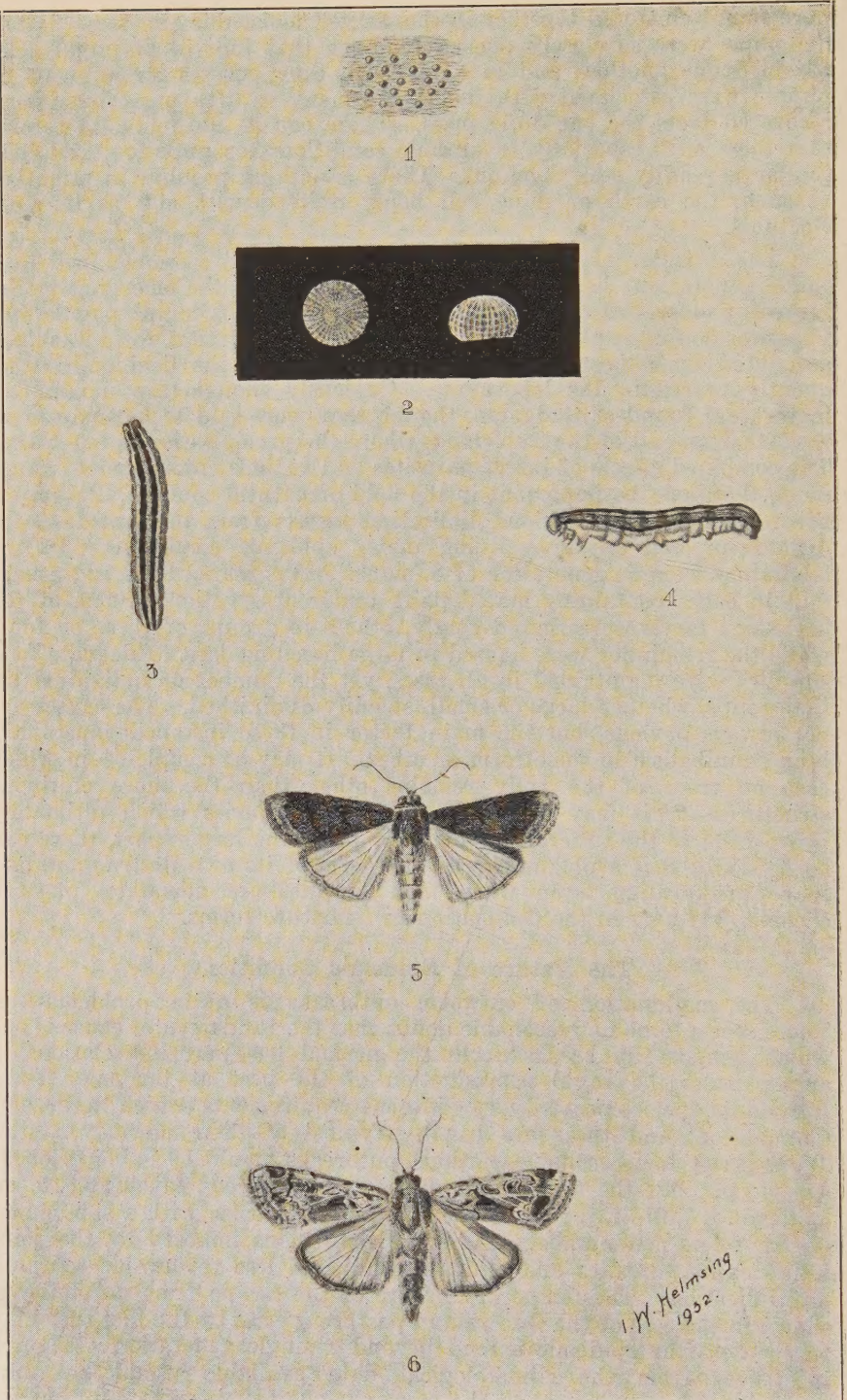


PLATE 31.

at this level until the 25th. Heavy precipitation followed, and continued more or less without intermission for a few days until 6th January, when high temperatures in the vicinity of 100 degrees maximum again were the rule. Between the two periods of high temperatures the humidities were above normal, and temperatures centred round the 80-degree mean maximum point.

Laboratory Data.

The life-history of *Spodoptera mauritia* follows closely that of better-known species with similar habits. Eggs are laid in clusters containing one or two hundred bun-shaped individuals, over which are strewn reddish hairs detached from the female body. The clusters are arranged either on the ground or on the flag of the host pasture plant. From these eggs larvæ emerge, which commence to feed immediately. In the early stages these larvæ are almost devoid of colour, but later the distinctive features of the mature larvæ appear, these consisting of vivid linear stripes in various shades of green, some of them barred with white. When full grown pupation takes place—in the soil if this is suitable, but more often in the dung masses strewn over the paddock—and these in turn give rise to the free living adult. Exact information concerning the Queensland species is limited, and the following data drawn from the recent outbreaks is therefore relevant:—

From moths of *S. mauritia* (Plate 31; fig. 6) egg masses were secured, these having been laid on the linen cover of the jars enclosing them over turf carrying a mixed pasturage of *Paspalum platycaule* and *P. conjugatum*. In the field such masses would ordinarily be laid on the surface of the ground, or possibly on the lower leaf surfaces. Each egg mass contained some 200 eggs, amongst and over which were strewn the reddish hairs and scales shed by the female during oviposition. The eggs may be in a single layer, or more often in tiers, each egg being iridescent and pale-white in colour. In general appearance each egg mass had a reddish colour, due to the superimposed hairs. The diameter of the bun-shaped egg (Plate 31; fig. 2) is three millimetres, and the incubation period was seven days.

The first-stage larvæ are white save for the head and subsetal blotches, the typical colour of the mature larva only becoming distinct in the third stage. In the generation under discussion there were five instars prior to pupation, the mean duration of each being as follows:—

- First stage—15th to 17th February
- Second stage—17th to 21st February
- Third stage—21st to 24th February
- Fourth stage—24th to 25th February
- Fifth stage—25th to 28th February
- Pupal stage—28th February to 6th March

PLATE 31.

Spodoptera mauritia Bois.

- Fig. 1.—Egg mass $\times 2\frac{1}{2}$ (after Smith).
- Fig. 2.—Egg, dorsal and lateral view $\times 25$ (after Smith).
- Fig. 3.—Larva, dorsal view, natural size.
- Fig. 4.—Larva, lateral view, natural size.
- Fig. 6.—Adult, natural size.

Spodoptera exempta Walk.

- Fig. 5.—Adult, natural size.

totalling just under three weeks. The mass emergence of adults from bulk stocks followed closely that from individual specimens kept in separate containers, though in the former successive instars occurred together in any one observation.

The fifth (or final) stage larva is 2.5 to 4.0 centimetres in length, with linear stripes as follows:—Dull-green central stripe with lighter subdorsal adjoining bands; between the subdorsal and the wide green lateral bands in a milk-white line; spiracular band dull-green; subspiracular milk-white; venter pale-green; head marked dorsally with a brilliant white V.

Control Measures.

Under ordinary circumstances outbreaks are not distinguished by any cumulative increase in the numbers of larvæ from generation to generation, each epidemic ending as quickly as it begins; hence farmers have considerable difficulty in devising ways and means of coping with a pest which bursts into the farm economy without warning, and, after effecting a great deal of damage in a very short time, disappears in much the same way. Once the pest appears a conjectural limit to the outbreak must be set, and for this purpose some discrimination must be used in deciding whether the further encroachment of new country is due to migratory forms from adjoining centres of infestation or merely the consequence of larvæ hatching from eggs laid *in situ* over a comparatively wide range. Protective measures have shown some success in the case of the former. For the latter special measures embodying liberal spraying are indicated, and these would only be practicable when the crop under treatment is of considerable value.

To counter migratory larvæ the usual practices are a combination of baiting and trapping methods. A deep furrow is ploughed as a line of demarcation between clean and infested parts of the crop in front of the line of advance of the species. A mould-board plough is most suitable for the purpose, as the straight face left by the vertically placed coulter acts as a soil wall, which the larvæ cannot climb. Paris green baits liberally applied along the line of the trench complete the destruction of the larvæ as they reach it. These baits must, of course, be used with discretion, and precautions must be taken to ensure that the food of man and animals is not contaminated by their application. Paris green is very poisonous; hence stock must be prevented from gaining access to the baits.

This method, though very useful in cultivated paddocks, proves less satisfactory in grass land, as the maintenance of an undisturbed furrow is much more difficult, while, quite apart from that, it is very difficult to observe the precise movements of the larvæ or estimate their limits in the field.

TO ROUGHEN CONCRETE FLOORS.

Etch surface with muriatic or commercial hydrochloric acid. Dilute 1 part acid to 5 parts water. Apply acid to floor surface and allow to remain until desired amount of roughness occurs. Then remove by thoroughly washing with water to prevent further action. A second treatment may be given if desired. Sprinkling ordinary ground limestone over the floor after cleansing also tends to prevent slipping.

Preliminary Experiments on the Mass Treatment of Poultry for the Roundworm, *Ascaridia lineata* Schneider.

By F. H. S. ROBERTS, M.Sc., Entomologist.

A RECENT survey of the helminth parasites of the domestic fowl has shown *Ascaridia lineata*, the large roundworm of poultry, to be present in 76.6 per cent. of the birds examined. Its presence has been noted more in young chickens than in older birds. In chickens it may be not only responsible for heavy mortalities, but may also prevent their growth, weaken their constitution, and make them little resistant to other and perhaps more serious diseases. Older birds may carry a fairly heavy worm burden without showing any visible ill-effects, but such an infestation must at least seriously reduce their egg-laying capacity. The part played by these infested older birds as reservoirs of infection for young chickens must also not be overlooked.

The literature concerning the treatment of poultry for the removal of this roundworm resolves itself into—(a) mass or flock treatment, in which large numbers of birds are treated together by certain drugs given in the food; and (b) individual treatment, where each bird is treated separately. There is no doubt that the individual treatment of any animal with drugs is the more efficient method for the removal of infestation. However, as poultry farms usually run some hundreds of birds, and as the catching and individual treatment of each bird may become exceedingly tedious and probably costly, the use of a moderately efficient method of mass treatment may be warranted in the case of poultry.

Three methods of mass treatment for worms in poultry have been advised in other parts of the world—

- (1) Feeding tobacco dust, containing 2 per cent. nicotine, in the daily ration for three weeks;
- (2) Steeping finely-chopped tobacco stems in water, and feeding in a small quantity of wet mash;
- (3) Feeding oil of chenopodium in a small quantity of wet mash.

These three methods have been critically tested on forty-two cockerels made available by the Poultry Advisory Committee..

The birds had been reared under worm-free conditions on concrete floors. When eight weeks old they were transferred to a battery with wire-netting floors. An examination of the fæces from each compartment showed no sign of parasitic infestation, and on 13th December, 1932, each bird was given approximately 700 viable embryonic eggs of *Ascaridia lineata*. Treatment was commenced on the 15th February, 1933, the period between infection and treatment being considered adequate for the worms to have reached maturity. The birds were divided into three lots of twelve and one lot of six. These groups were treated as follows:—

Tobacco Dust Treatment.

At the time treatment commenced the twelve selected birds were all healthy, and showed no visible evidence of infestation. They were fed for

three weeks on a ration containing 2 per cent. tobacco dust purchased as containing 2 per cent. nicotine. At intervals of ten days the birds were given a dry mash containing magnesium sulphate at the rate of 11 oz. for 100 birds.

On autopsy the birds showed a total of seventy-eight worms remaining. No pathogenic effects of the treatment were noticed at any time during the period of the experiment, and the birds did not seem to object to any great extent to eating the treated mash.

Oil of Chenopodium Treatment.

A second group of twelve birds was given oil of chenopodium in a small quantity of wet mash. The quantity of chenopodium given was $3\frac{1}{2}$ ccs., or approximately one teaspoonful. The group, after being starved for twenty-four hours, consumed the treated mash in about four hours. On autopsy six days after treatment sixty-nine worms were collected. No ill-effects of the treatment were noticed in any of the birds except in one case, when the intestine showed signs of mild enteritis. As a similar condition was shown by one of the control, untreated birds, it is probable that in the case of the treated bird the drug was not concerned.

Steeped Tobacco Stem Treatment.

The third group of twelve birds was fed steeped tobacco stems, the treatment being conducted as follows:—The birds were starved for twenty-four hours, and then fed finely chopped-up tobacco stems at the rate of 1 lb. to 100 birds. The tobacco stems were steeped for two hours in just sufficient water to cover them, and then fed in a small quantity of wet mash. Two hours after this treated mash was eaten the group was given a small quantity of dry mash containing magnesium sulphate at the rate of 11 oz. for 100 birds. The treatment was repeated after ten days.

No difficulty was experienced in getting the birds to consume the treated mash. The birds were killed six days after the second treatment, and yielded a total of sixty-three worms.

On the second and third day after each treatment it was noticed that the fæces were flecked with blood, denoting a condition of acute intestinal congestion, and on autopsy three birds were noted to be severely affected.

Control.

The fourth group of six birds was retained as an untreated control. The birds were killed at the conclusion of the experiment, and yielded a total of fifty-nine worms.

Tabulation of Results.

The results of the experiment are expressed in the following table:—

Group.	Treatment.	No. of Birds.	Worms Remaining.	Average Worms per Bird Remaining.	Efficiency.
1	Tobacco Dust	12	78	6.5	34%
2	Steeped Tobacco	12	63	5.2	47%
3	Chenopodium	12	69	5.7	42%
4	Untreated	6	59	9.8	..

It is considered that groups of animals reared under similar conditions and fed an equal number of worm eggs would, providing the group is composed of an adequate number of individuals, show total infestations approximately equal. The number of birds (twelve) in the treated groups and (six) in the control group was thought large enough to overcome any inconsistencies that may have arisen from individual resistances. The percentage efficiency is computed as the average number of worms removed from each bird in each group as compared with the average number remaining in the controls. For example, in the group treated with tobacco dust the total number of worms remaining in the twelve birds was seventy-eight, an average per bird of 6.5. The total number remaining in the controls (six) was fifty-nine, an average per bird of 9.8. The percentage of worms removed is therefore—

$$\frac{9.8 - 6.5}{9.8} \times 100 = 34.$$

Discussion.

The results of this experiment cannot be regarded as at all satisfactory in view of the small number of worms infesting the various groups. It is difficult to account for such a small residual infestation after feeding approximately 700 eggs to each bird. The eggs appeared quite healthy, and were certainly in the infective stage. Better results would possibly have been obtained by feeding large numbers of eggs daily for some days. The worms collected from the birds were all small and immature. *Ascaridia lineata* is said to reach maturity in about fifty days. The immature worms present eighty days after infection would therefore denote an extreme resistance exhibited by the birds to infestation. As the birds were approximately three months old when infested, this resistance may have been due to age, as an age resistance among chickens to *Ascaridia lineata* has been demonstrated.

The appearance of blood in the droppings of the group treated with steeped tobacco would tend to suggest that under certain circumstances this treatment cannot be regarded as safe, and until further investigations are made should not be recommended, even though it has shown the highest efficiency of the methods used.

In view of the good results obtained by workers in the United States of America from tobacco dust, those obtained in this test are very disappointing. That the tobacco dust used, although purchased as containing 2 per cent. nicotine, showed only .86 per cent. on analysis is no doubt responsible for the comparatively low efficiency of the treatment. The use of 2 per cent. tobacco dust for a three-weekly period appears reasonably safe, but as its efficacy entirely depends on the nicotine content every attempt should be made to obtain a standard dust containing 2 per cent. nicotine before any recommendation is made. If this is done its use may be recommended as a matter of farm routine, but the period of treatment is considered far too long where cases of heavy infestation are encountered.

Under the circumstances of the experiment, oil of chenopodium may be regarded as a safe drug which may be depended upon to shift a percentage of the worms present. The small percentage removed indicates at least three treatments at ten to fourteen days intervals.

MINT WEED (*Salvia lanceifolia*).

By E. H. GURNEY, Senior Analyst.

OWING to the increased growth of this weed, particularly along stock routes, experiments were conducted at Pittsworth for the purpose of determining the effect of some weed destroyers upon this plant.

The substances "Weedex" (*Calcium chlorate*), Ferrous Sulphate, and common salt were used, as being non-injurious to stock.

The spraying of the weed was done on small areas—viz., 405 square feet—and Mint Weed was practically the only plant growth on these areas. The growth of the weed was very similar in each area, ranging from 1 inch to 12 inches in height. Owing to previous rain there was a profuse growth of weed, but at the time of spraying—3rd November, 1932—it was warm weather and in places the surface soil was dry. This dryness of soil was evidenced by the fact that with the smaller growth the leafage of the weed was more or less wilted, but with the larger growth occurring in different patches throughout the areas where moisture still existed the leaves were in a healthy state and not wilted.

The quantities of weed destroyer used on the different plots are given below. Also, if such quantities were applied at the same rate per acre, the cost of the weed destroyer per acre:—

				Gallons of water.	Strength of solution. Per cent.	Cost of material used per acre. £ s. d.
		lb.				
1. Weedex	..	..	2 in 2	..	10	.. 3 9 10
2. Weedex	..	..	2 in 4	..	5	.. 3 9 10
3. Weedex	..	..	1 in 4	..	2.5	.. 1 14 10
8. Weedex	..	..	2.2 in 1	..	22	.. 3 16 10
4. Ferrous Sulphate	..	..	2 in 2	..	10	.. 1 7 2
5. Ferrous Sulphate	..	..	4 in 2	..	20	.. 2 14 4
9. Ferrous Sulphate	..	..	8 in 3	..	26.6	.. 5 8 8
6. Salt	..	..	2 in 2	..	10	.. 0 13 0
7. Salt	..	..	4 in 2	..	20	.. 1 6 0
10. Salt	..	..	8 in 3	..	26.6	.. 2 12 0

Inspector H. McBean, Pittsworth, inspected and reported on the results of these spraying experiments.

The first report was made ten days after spraying, and the second report was made five weeks after spraying. The following are Inspector McBean's reports of the different plots:—

First Report—14th November, 1932.

1. Tops of the mint partly dead and dying.
2. Tops of the mint partly dead and dying.
3. Tops of the large mint partly dead, small plants not affected.
8. Mint plants dying (best results).
4. Plants not affected.
5. Plants not affected.
9. Plants not affected.
6. Top of the mint partly dead.
7. Top of the mint partly dead.
10. Top of the mint partly dead and dying.

Second Report—9th December, 1932.

1. Portion of mint dead, portion only top leaves dead, rest making good growth, and young plants coming up in hundreds.
2. Ditto.
3. Plants unaffected, about 14 inches high.
8. Portions of plants dead, other portions showing new growth on old stalks.
4. Plants unaffected, about 14 inches high.

5. Plants unaffected, about 14 inches high.
9. Unaffected.
6. Plants unaffected, about 14 inches high.
7. Portion of plants dead in places, other plants unaffected.
10. Portion of plants dead in places, young plants growing thicker than ever.

When the results obtained in these experiments are reviewed it will be noticed that the Ferrous Sulphate did not affect the growth of the Mint Weed in any way; that the stronger solutions of "Weedex" and salt killed only some of the plants; and that such solutions in other cases only killed the top leaves of the sprayed plants; and that on all the plots new and vigorous growth of the weed ensued.

It should be stated that in the time between spraying and reporting results 437 points of rain fell.

From these experiments it is concluded that the destruction of Mint Weed on any large areas with the non-poisonous to stock materials mentioned above is quite impracticable.

It may be stated that the Council of Scientific and Industrial Research is having inquiries made as to the possibility of the biological control of Mint Weed.

QUEENSLAND SHOW DATES, 1933.

Dalby: 5th and 6th April.
 Beenleigh Campdraft: 8th April.
 Oakey: 8th April.
 Chinchilla: 11th and 12th April.
 Boonah Campdraft: 17th April.
 Miles: 19th April.
 Nanango: 20th and 21st April.
 Tara: 26th April.
 Kingaroy: 27th and 28th April.
 Goondiwindi Campdraft and Show: 28th and 29th April.
 Taroom: Campdraft, 1st; Show, 2nd and 3rd May.
 Wondai: 4th and 5th May.
 Boonah: 3rd and 4th May.
 Monto: 3rd and 4th May.
 Blackall: 9th to 11th May.
 Charleville: 9th and 10th May.
 Beaudesert: 10th and 11th May.
 Mundubbera: Abandoned.
 Mitchell: 17th and 18th May.
 Murgon: 11th to 13th May.
 Ipswich: 16th to 19th May.
 Goomeri: 18th and 19th May.
 Gayndah: 17th and 18th May.
 Kilkivan: 22nd and 23rd May.
 Roma: 23rd to 25th May.
 Gympie: 24th and 25th May; Campdraft, 27th May.
 Toogoolawah: 26th and 27th May.
 Kalbar: 27th May.

Maryborough: 30th and 31st May, and 1st June.
 Callide Valley: 2nd June.
 Marburg: 3rd to 5th June.
 Childers: 5th and 6th June.
 Wowan: 8th and 9th June.
 Bundaberg, 8th, 9th, and 10th June.
 Lowood: 9th and 10th June.
 Gladstone: 14th and 15th June.
 Rockhampton: 20th to 24th June.
 Mackay: 27th to 29th June.
 Laidley: 28th and 29th June.
 Bowen: 5th and 6th July.
 Gatton: 5th and 6th July.
 Ayr: 7th and 8th July.
 Townsville: 11th and 12th July.
 Caboolture: 13th and 14th July.
 Rosewood: 14th and 15th July.
 Nambour: 19th and 20th July.
 Charters Towers: 19th and 20th July.
 Esk: 21st and 22nd July.
 Ingham: 21st and 22nd July.
 Atherton: 25th and 26th July.
 Cairns: 25th to 27th July.
 Maleny: 26th and 27th July.
 Pine River: 29th July.
 Royal National: 7th to 12th August.
 Crow's Nest: 23rd and 24th August.
 Home Hill: 1st and 2nd September.
 Mary Valley: 1st and 2nd September.
 Nerang: 13th October.

DAIRY CATTLE IMPROVEMENT.

"It is apparent that a misconception exists in the minds of many dairy farmers as to the objects of the Dairy Cattle Improvement Act, while many are apprehensive of the attitude to be adopted in the administration of the Act," said the Hon. F. W. Bulcock, Minister for Agriculture and Stock, in the course of a recent Press interview.

Continuing, he said that at the initial meeting of the Dairy Cattle Improvement Board held at the Department early in March, it was considered desirable that many dairy farmers generally should be made acquainted as early as possible with the salient features of the Act, which would immediately remove the feeling of doubt existing in many quarters, and replace it with a feeling of confidence. In this connection it was interesting to note that on every occasion where the principle and objects of the Act had been explained to dairy farmers, they had accorded the scheme their enthusiastic support.

The Minister explained that under the Act all bulls in dairying districts had to be licensed at a fee of 5s. per annum, but that bulls used solely in the breeding of beef cattle may secure exemption on application. It should be particularly noted, however, that for the first two years all bulls will be licensed irrespective of type, and that not till after this period of two years has elapsed may licenses be refused, and the gradual elimination of nondescript and worthless types of animals be begun. This should reassure dairy farmers that no bulls will require to be discarded for the next two years, and even then the types of bulls to be eliminated in the early years will be merely unsuitable and nondescript animals.

"It should be remembered, however," added Mr. Bulcock, "that the license fees were required to be placed in the Dairy Cattle Improvement Fund, which has to be utilised solely in the service of dairy farmers in the improvement of their herds. The Production Recording Scheme of the Department is being extended with the co-operation of butter factory directorates and managements, and all dairy farmers may thus take advantage of the free facilities offered in the testing of their cows for production. This is a service for which dairy farmers in other States and countries are required to pay from 3s. to 6s. per cow.

"The Department also assists dairy farmers to secure approved sires by defraying the cost of the railway freight, which in itself is a valuable service, the maximum rebate being equivalent to the license fee for forty years.

"Dairy farmers will also secure an improved veterinary service in the control of the health of stock.

"The Dairy Cattle Improvement Board has indicated to me that it is preparing a scheme of activity securing the co-operation of Local Producers' Associations for the dissemination of information among the members, and thus extending the educational activities of the Dairy Branch of the Department."

PIG RECORDING.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

THE time has arrived when pig breeders require some better guide than pedigree and appearance in the selection of breeding stock. Dairy cattle breeders and poultry breeders have had the use of production records in the selection of the stock for years past, and have been able to effect considerable improvement in their stock as a result. The pig breeder must be supplied with similar information if he is to maintain or improve the productivity of his pig herd.

Although our show societies have done a great deal of good encouraging the breeding, exhibiting, and distribution of good pigs, and have tried to eliminate the low-producing animal, we still have a basis of appearance and pedigree only on which to judge our pigs, productivity being practically overlooked because there has been no efficient method of judging it. Purebred prize-winning stock are no better than mongrel stock unless they have a greater producing power.

There is no better means of advertising breeding pigs than by submitting them to a test of production which is controlled by an official body and which would distinguish the low producers from the high producers, thus providing the stud breeder and the ordinary breeder with a guide to selection.

To supply pig breeders with an authentic record of the production of their breeding pigs, recording schemes have been put into operation in most of the important pig-raising countries, and the Queensland Branch of the Australian Stud Pig Breeders' Society has moved in this direction in so far as it has co-operated with the Department of Agriculture and Stock in preparing a proposed scheme of pig recording for Queensland stud-pig breeders. The proposed recording scheme is as follows:—

The measure of production to be the total litter weight and number of pigs in the litter at eight weeks old.

At the commencement, the recording to be confined to the herds of stud-pig breeders, and to be voluntary.

All breeding sows on the property to be tested for a period of twelve months.

The recording authority to have the right to publish records of all purebred litters and this to be done periodically in agricultural and live stock papers.

Notification of the expected birth of a litter to be sent to the recording authority fourteen days before expected; birth and notification of the actual birth of the litter to be sent to the recording authority within forty-eight hours of such birth.

The recording officer to be provided with weighing scales and to have the right of access to the breeders' property at all times to check, mark, and weigh pigs.

Litters to be weighed as near to eight weeks as possible, and the actual weights and the adjusted weight to eight weeks to be recorded by the officer.

A certificate of performance to be supplied to the owner of each sow tested.

The stud breeders have approved of this work being initiated and are seeking the assistance of the Department of Agriculture and Stock.

The records thus obtained should give valuable information regarding the prolificacy and milking capacity of breeding stock and the growth of young pigs, and if it can be successfully worked the recording scheme may later be extended to the testing of representative pigs from recorded litters at an officially-controlled experiment station, where all pigs would be fed similarly and marketed when they reached maturity as porkers, light bacons, and export porkers. Thus a record could be obtained of economy of feeding, the rate of growth, and the suitability for the trade for which the pigs had been bred.

WEIGHT-FOR-AGE PIG CLASS AT BRISBANE SHOW.

A new class has been included in the pig section of the Royal National Association schedule covering the 1933 Brisbane Royal.

With weight-for-age conditions governing it, some excellent data should be provided for the industry, for fast-growing litters of pigs eminently suitable to the pork trade are sure to be in the majority, and an object-lesson for breeders who are desirous of participating in such trade will be presented.

Each exhibit in this new class is to consist of all the pigs of any one litter which, on judging day, weigh 90 to 120 lb. each alive. To enable inspection and marking by a representative of the Association, nominations for the contest must be made not less than fourteen days before the birth of the litter, and notification of the date of birth of the litter must be forwarded to the secretary within twenty-four hours of such birth. Each litter must have been sired by a registered boar.

The prizes will be:—First, £10 10s. and trophy; second, £5 5s.; third, £2 2s.

Points will be allotted in accordance with the following scale:—Suitability of pigs for pork-trade requirements up to 100 points. Litter weight for age—5 points for each 1 lb. weight per day—i.e., total litter weight on judging day divided by number of days of age and multiplied by five.

Prizes will be allotted to the exhibits awarded the greatest aggregate.

THE QUEENSLAND PIG INDUSTRY.

THE belief held by certain bodies associated with the pig industry in Queensland, that the system of organisation of the industry in this State was by no means complete, and that the time was opportune for a review of the whole structure surrounding the pig and allied industries in Queensland, formed the principal subject for debate at a conference of representatives of the pig industry in Queensland recently, and at which the Minister for Agriculture and Stock, Hon. F. W. Bulcock, M.L.A., presided.

The conference was comprised of representatives from the following interests:—Queensland University, exporters, manufacturers and distributors, agricultural organisations, producers, Government departments, and others including stock-selling agents.

After referring to the apparent need for organisation in the pig industry, Mr. Bulcock said that, after giving full consideration to the matter, an agenda paper had been prepared on the most comprehensive lines for consideration by delegates. It was significant, he continued, that although the pig industry was one of the oldest in the world, that industry had received the least attention of all, more particularly the economic side of it, and it had reached the stage when the pig must have certain specific characteristics in order to make the carcass acceptable to the public.

Research Work.

Under the recent system of reorganisation it is proposed (under the Director of the Animal Health Station) to engage in experimental work on some of the problems surrounding the pig industry such as nutrition, disease, &c. It is hoped that this work will be of considerable value to the industry.

He pointed out that the fundamental necessity as far as the growers are concerned, is to get a fair and equitable return for the labour they put into their work, and the capital involved. The existing legislation had been used by other branches of agriculture to advantage, and the same legislation could be applied to the pig industry.

Others who addressed the conference included Mr. E. E. Forth, (J. C. Hutton's Proprietary, Limited), Mr. R. G. Watson (Australian Stud Pig Breeders' Society), Mr. J. Barker (Pig Fatteners), Mr. J. A. Heading (Queensland Bacon Association, Limited), Mr. W. Krimmer (Darling Downs Co-operative Bacon Association, Limited), Mr. J. P. Bottomley (Royal National Association), Mr. J. F. McRobert (Council of Agriculture), Professors E. J. Goddard and J. K. Murray (of the Queensland University and Gatton College), Dr. Vickery (Council for Scientific and Industrial Research), Mr. A. H. Cory (Chief Inspector of Stock), and E. J. Shelton (Senior Instructor in Pig Raising).

New Council Formed.

Conference agreed with the Minister on the necessity for organisation, and it was finally resolved that the name of the new organisation be the Queensland Pig Industry Council.

It was decided that the council consist of the following representatives:—

TRADE REPRESENTATIVES (5).—One each being appointed by the following:—Queensland Meat Industry Board, meat exporters, co-operative bacon factories, proprietary bacon factories, stock-selling organisations.

PRODUCERS' REPRESENTATIVES (6).—One each being appointed by the following:—Pig fatteners (suburban pig farmers); Council of Agriculture (one for North, Central, and Southern Queensland); Australian Stud Pig Breeders' Society; Chamber of Agricultural Societies.

GOVERNMENT REPRESENTATIVES (5).—One each being appointed by the following:—Meat Export Branch (Commonwealth); Director of Marketing (State); Instructors in Pig Raising (State); Animal Health Station (State); Queensland Agricultural High School and College (State).

TRANSPORT (2).—One each from the railways, overseas shipping companies, and one each from the Queensland University and Council for Scientific and Industrial Research, the Department of Agriculture and Stock to provide a secretary.

In thanking delegates for their attendance, the Minister stated that anything that could be done for the development of the industry must be done in the interests of the State as well as in the interests of those engaged in the industry. He thought that the council that had been appointed would be of great service to the pig industry. He was of opinion that the big maize-producing countries of the world would become the large pig-producing countries. He assured delegates that when the deliberations of the council reached him he would give them the utmost sympathy and consideration, and he would always be pleased to place his officers at the disposal of the council and the industry as a whole.

SILOS AND SILAGE.

By A. E. GIBSON, Instructor in Agriculture.

OWING to the numerous requests for information received by this Department relative to silos, it has been deemed advisable to reprint this article which appeared in the July, 1925, issue of the Journal.

Question 1.—What is the best form of silo?

Answer.—A properly roofed and watertight cylindrical structure of reinforced concrete built overground and having an internal chute for emptying purposes in preference to doors.

Question 2.—Which is the better plan? Having the height greater than the diameter or vice versa?

Answer.—Silage rapidly depreciates when exposed to the atmosphere; consequently in order to reduce surface exposure to a minimum the diameters of silos are reduced as much as possible, whilst the height is increased in order to give a greater pressure to the silage for the purpose of compaction and consequent exclusion of air from the silage. Usually the proportion of height to diameter is 2 to 1 respectively, and is found to be economically preferable to those in which the height compared to the diameter is at a higher ratio, say, $2\frac{1}{2}$ or 3 to 1.

Silos which are excessively high require greater strength in foundations and walls, apart from which higher power and more expensive machinery is necessary for the filling.

Question 3.—Or is there any specific proportion between diameter and height?

Answer.—This question is really answered under Answer 2, but, whilst there is no distinct or specific proportion between diameter and height, it must be clearly understood that as the diameter increases to the ratio of the height so is the density of the silage decreased unless some form of artificial pressure is used.

Question 4.—Which is the best silo? Above ground level, below ground level, or half and half?

Answer.—Although it is admitted that the filling of a pit or underground silo is extremely economical and can be effected with a minimum amount of machinery and labour, the process of emptying the silage therefrom is the most costly and strenuous of all forms of silos. The overhead silo, whilst requiring a little more power and machinery for the filling, is the most economical of all when it comes to the operation of emptying. The silo which is half above and half below ground level has all the drawbacks of the pit and overhead silo, whilst only possessed of half the benefits of the latter.

Briefly, the merits of the three silos may be summed up as follows—

Pit Silo.—Economical in filling, expensive in emptying (it requires the services of two operatives to empty a pit silo).

Overhead.—Slightly more expensive, due to increased power and machinery in the process of filling, but is decidedly economical in the process of emptying.

Half aboveground.—Costs practically the same to fill as an ordinary overhead silo, and is as cheap to empty down to ground level. From that on the cost of emptying becomes greater with the depth below surface.

Question 5.—Give dimensions for building a 50-ton silo.

Answer.—Silo internal diameter 11 ft. 6 in.; height, 23 ft. 3 in.

Question 6.—Give quantities for making same.

Answer.—For a 50-ton silo, using a 4-2-1 mixture—i.e., four parts of broken stone, two of sharp sand, and one of cement—you would require:—Cement, 70 bags; stone aggregate ($\frac{3}{4}$ -in. gauge), $14\frac{2}{5}$ cubic yards; sharp sand, 8 cubic yards; reinforcement, 2 coils 36-in. K-Wire netting, 10 gauge; rendering, 1 in. inside and out, $2\frac{1}{2}$ cubic yards sand; 36 bags cement. Roof specifications depend on style adopted (gable or octagon).

Question 7.—How would you work out the necessary information from Answers 5 and 6 to enable one to build (a) larger silo, (b) a smaller silo?

Answer.—Diameter $2 \times .7854 \times \text{height} \div 48 = \text{tons capacity}$. Diameter $\times 3\frac{1}{7} \times \text{height} \times \text{thickness of wall in feet} \div .27 = \text{cubic yards contents of wall}$.

Based on the proportions of 4-2-1—i.e., four of stone, two of sand, one of cement. To each cubic yard of concrete 540 lb. of cement are required ($4\frac{1}{2}$ bags). Of aggregate (stone) broken to gauge (in this instance $\frac{3}{4}$ in.) nine-tenths of 1 cubic yard are required and $\frac{1}{2}$ cubic yard of sharp sand.

The cement and sand together do not appreciably increase the bulk of the concrete, as they fill up the interstices in the aggregate.

Rendering (inside and out) is calculated at 2 to 1 (2 of sand and 1 of cement). This will give a sufficiently watertight job without the addition of water-proofing material.

Question 8.—What acreage of maize will fill a 50-ton silo?

Answer.—This, of course, depends on the crop; also the manner in which it was sown—i.e., broadcast or drilled. Under ordinary circumstances the quantity required should be easily obtained by the cultivation of 5 acres of maize sown in drills—which method is recommended at all times in preference to sowing broadcast.

Question 9.—How is a silo filled?

Answer.—By a power-driven elevator of a similar pattern to that used on chaff or grain elevators, slats of timber being substituted for cups, or by blower—the latter being simply a fan blast driven at a high rate of speed with delivery pipes of 6 in. and upwards led directly into the silo at the top. More power is required to a “blower” than an elevator. Whatever system is adopted for the purpose of conveying the chaffed green material from the chaff or silage cutter to the silo must make provision for its equal distribution. Where chaffed maize is indiscriminately fed into a silo, the tendency will be found for the heavier (stalk) portions to lodge in the centre, whilst the lighter (leafy) class of material accumulates around the walls.

Unless this is thoroughly incorporated with the heavier class of fodder in the subsequent fermentation which takes place, uneven settlement results. The centre, by reason of its greater solidity, does not settle to the same extent as the outside or lighter material; consequently a shrinkage from the walls occurs, admitting air, which, once fermentation has lessened, brings about a gradual decay of all the exposed surfaces of the silage.

To overcome this, all material fed into silos must be evenly incorporated and tramped tightly along the walls, and around all doors of internal chutes. To do this thoroughly necessitates the presence of a competent and reliable operative in the silo during entire filling operations. Note that all doors that come in contact with the silage must be rendered airtight. This can be effected by covering them with tarred brown paper.

Although the question was not asked by the correspondents, it is thought that a few points on emptying will not be amiss.

When emptying use a strong-toothed rake, and rake evenly from the top the amount of silage required for the daily ration. At all times avoid digging into the bulk of the silage. Remember that the more even and level the surface of the silage is left after each daily ration is obtained, the less decomposition and consequent waste will occur. If your silo has doors fitted to it, keep them closed; there is then less strain on the hinges and the doors (which are weighty) would fit more snugly when refilling, apart from which there will be no chance of rain destroying the silage, for nothing tends to bring about the decomposition of silage quicker than the admission of either air or water.

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

A NEW TYPE OF REINFORCED SILO.

A. E. GIBSON.

THE attention of farmers and stockowners who contemplate the erection of a silo for the purpose of fodder conservation is drawn to the new type of reinforced cement silo, a specimen of which has recently been erected near Beenleigh and inspected by the writer. The following particulars are made available for the information of those interested in any form of silo construction:—

It is in connection with silos that emphasis is placed upon the advantages which this process bears in contrast with the reinforced concrete system.

Briefly, some of the advantages are—

- (a) Saving in cost and freight or cartage of gravel or broken stone.
- (b) No special forms or moulds required, which are more or less costly to manufacture or transport.
- (c) The internal diameter of silo can, if desired, be enlarged or decreased without difficulty.
- (d) No costly mixing plant or heavy labour of concrete mixing involved generally in the construction.
- (e) Cost of construction considerably cheaper.

With the exception of the base or floor of the silo, the whole of the construction of the walls and roof consists of reinforced cement, fibre, and sand, referred to as the compo.

In erecting, the base of reinforced concrete is laid slightly in excess of the outside diameter of the finished silo, and in conformation is somewhat similar to that of an inverted saucer, with the thickness of concrete immediately below the walls. The reinforcement consists of galvanised No. 8 wire meshed and led out to the circumference of the base for the purpose of splicing with the external reinforcing wires referred to later on.

Upon this base is built a hollow cylindrical structure of 6 by 1 pine boards placed vertically and kept in position by templates suitably spaced.

An outside scaffolding is erected that will permit of the compo. being applied efficiently. A compo. of asbestos fibre, cement, and sand is applied to the outside face of the cylinder and is floated over the whole of the wooden surface to a depth of $\frac{1}{4}$ inch. Following on this coating a reinforcement of wire-netting $1\frac{1}{2}$ inch by 16-inch gauge is applied with the selvedge placed horizontally. A rendering of sand and cement compo. is then applied, which is followed by another line of reinforcement of similar material and cemented as before, and finally the outside wires spliced to the reinforcing wires of the base are led to the top of the silo in a diagonal direction and a rendering of compo. applied. The final coating may be roughcast or smooth finish as desired. Doors of cement bevelled edged and fitted to a corresponding bevel cast in the silo walls are provided, or if preferred an internal chute can be constructed. The roof may be of the same type of construction as that of the walls or may be of the usual wood and iron gable construction associated with reinforced concrete silos. Where the roof is constructed of reinforced cement, it is cone-shaped, and provision is made for the admission of the top of the elevator by means of a gable built into the roof.

The illustrations show a silo in the course of construction, built for Mr. J. W. Davidson on his farm at Beenleigh, and when photographed represented the work of two men for a period of three days, which will serve to show the rapidity with which a silo of this type can be constructed.

As a cheap, efficient, and lasting type of silo, Winterburn's patent should appeal to those contemplating the erection of a modern silo, the agents for which are the Queensland Fibro Cement Construction Co., 16 Victory Chambers, Queen street, Brisbane.



PLATE 21.—Top view of silo. Note position of boards forming mould.



PLATE 22.—Close up of reinforcement being applied; part of which has received a coating of compo.

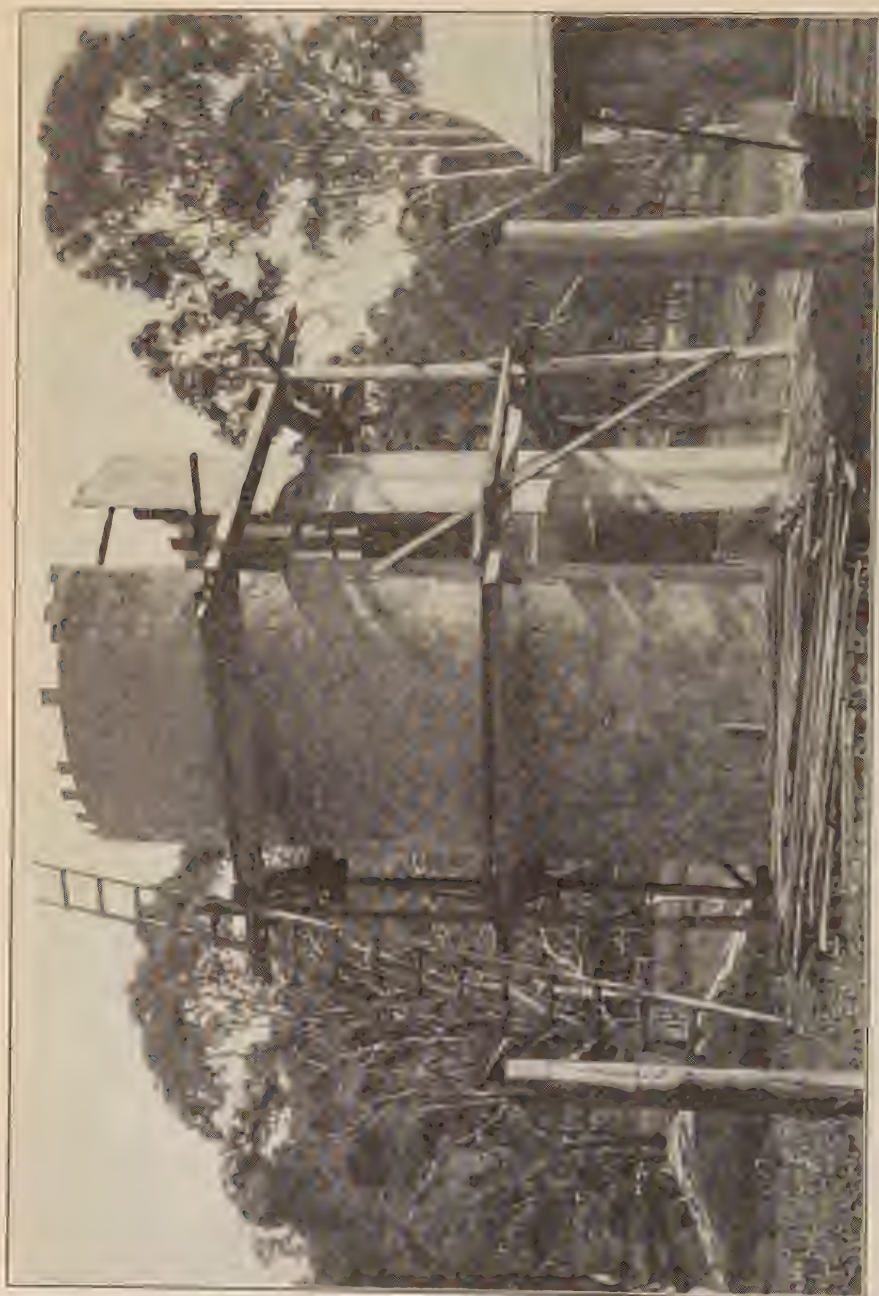


PLATE 34.—General view of silo in course of construction; the result of three days' work by two men.

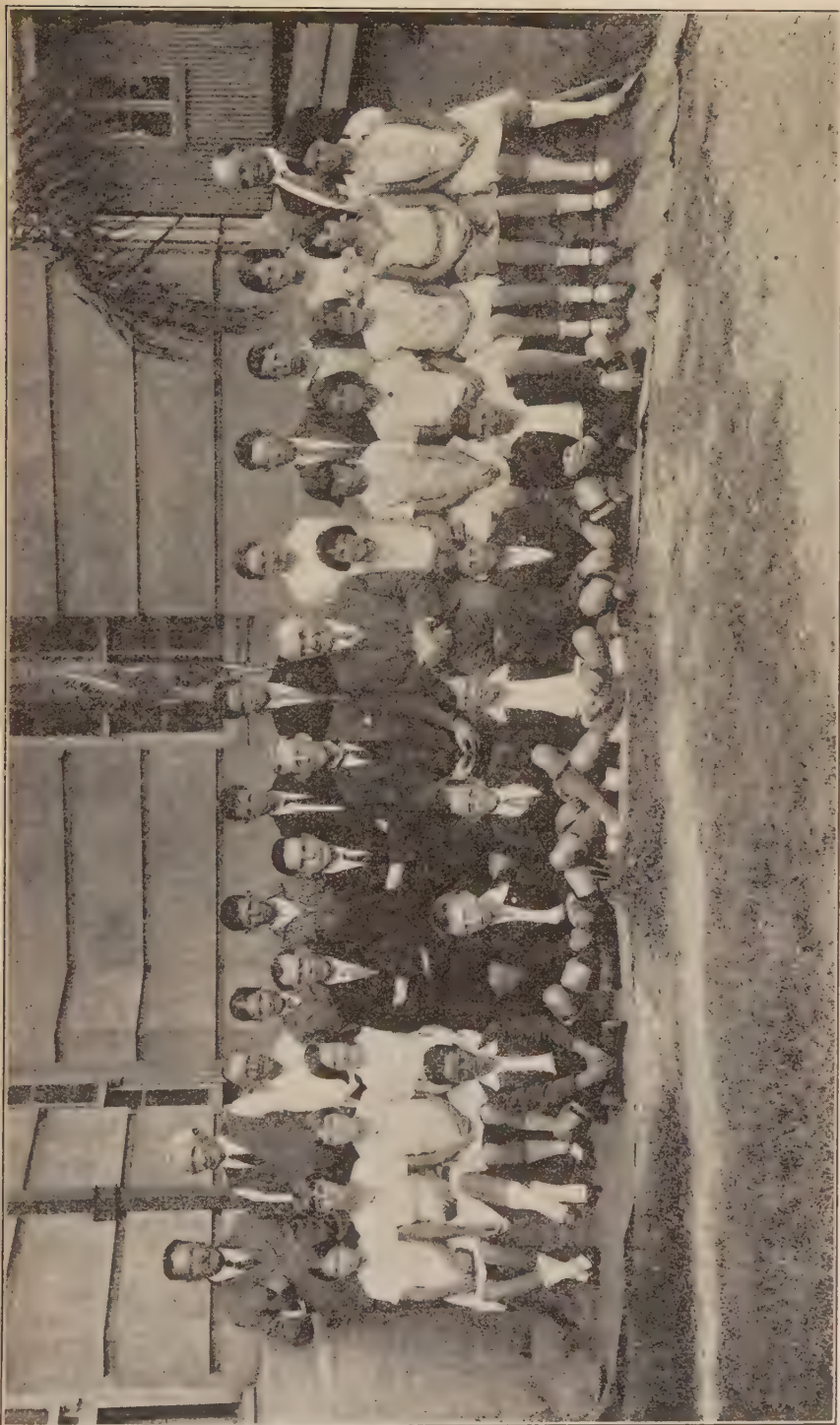


PLATE 35.—MORNINGSIDE HOME PROJECT CLUB.

The Morningside State school is the only city school at which a rural project scheme is in actual operation. The picture was taken on the occasion of a visit of club members to the Department of Agriculture and Stock. In the centre of the group, seated, is the Minister (Hon. Frank W. Bulcock, with the Director of Education, Mr. B. McKenna, on his left, and Messrs. W. J. Copley, M.L.A., and W. Krause (teacher in charge) on his right. Departmental officers standing in the rear rank are: Left to right, Messrs. J. F. Reid (Editor, "Q.A.J."), G. B. Brooks (Director of Agriculture), and on the extreme right, Miss May Bryant and Mr. R. Wilson (Assistant Under Secretary).

In Memoriam.

GEORGE WILLIAMS.

WIDESPREAD regret was felt at the passing of George Williams, Director of Fruit Culture in the Department of Agriculture and Stock, on Friday, 10th March. He was sixty-one when the end came after a long illness borne with extraordinary fortitude and a cheerfulness that was an inspiration to those in close association with him. In fact, it may be said that it was his indomitable will that kept him alive during the last year of his life. With remarkable courage he attended to the work which was his lifetime vocation up to within a few weeks of his death; and so he died, as he desired, practically in harness.

There was no better known or more highly respected man in Queensland horticulture than George Williams. He joined the Department of Agriculture as Inspector of Plants at Rockhampton in 1899, and subsequently served in the Cairns district, where his extensive knowledge of tropical fruit culture, both as an instructor and as an experimentalist, was a factor in the firm establishment of the fruit industry in the far North. While in North Queensland he also had much to do with the establishment of the citrus-growing industry at Charters Towers and other places. He was appointed Assistant Instructor in Fruit Culture in 1913, Instructor in Fruit Culture in 1922, and Director in 1928.

To his official life the late George Williams brought the fidelity, integrity, breadth of outlook, and thoroughness that characterised his private life. To him, "the reward of a thing well done is to have done it." His interest in progressive horticulture was deep and genuine, and his generosity in passing on to others the information drawn from a wealth of experience and keen observation in the nursery and orchard was proverbial.

Fruitgrowers throughout the State have, from time to time, paid tribute to the valued services of George Williams during his long association with the Department. Endowed with an attractive and genial personality and innate courtesy, he enjoyed a wide popularity, not only among those interested in the fruit-growing industry, but also among all classes of the community, and especially his fellow officers.

Banana-growers, particularly, will miss the benefit of his character, ability, and sound judgment as Chairman of the Queensland Banana Industry Protection Board; while for the fruit industry generally he performed notable service as Government representative on the Committee of Direction of Fruit Marketing.

In his younger days, he took a very keen interest in the Volunteer movement, firstly as a member of the Port Curtis Infantry, and afterwards as Officer Commanding the Machine Gun Section in the 15th Australian Light Horse. He was also an expert rifle shot.

The late George Williams was laid to rest in the Lutwyche cemetery on Saturday, 11th March, in the presence of a large gathering of citizens, which included representatives of every section of the fruit industry and commercial community, as well as many of his fellow officers of the Department. Expressions of sympathy were received by the bereaved family from all parts of the State, and they included messages from the Hon. Frank W. Bulcock (Minister for Agriculture and Stock) and former Ministers of the Department, Hon. W. Forgan Smith (Premier) and Mr. Harry F. Walker.



PLATE 36.

THE LATE GEORGE WILLIAMS.

Director of Fruit Culture, Department of Agriculture and Stock.



PLATE 37.—DEGILBO SHIRE.—GOOMERI-CHILPERS ROAD, ROCKY CREEK CAUSEWAY.



PLATE 38.—GLENGALLAN SHIRE.—TOOWOOMBA-WARWICK ROAD.
Cement penetration on heavy black soil—built to test comparative values of this or
the heavy macadam type of construction.

[Photos.: Main Roads Commission.]

Answers to Correspondents.

BOTANY.

Saffron Thistle.

“THISTLE” (Nanango)—

The specimen is *Carphamus lanatus*, the Saffron Thistle, a native of the Mediterranean region, now found as a weed in most of the warm temperate regions of the world. It has been established in Queensland for some time, but fortunately does not seem to have spread to any great extent. It is very abundant in parts of New South Wales, and some graziers say that it makes quite good fodder when very young, but soon loses its value, growing up with a hard stem and prickly leaves and becoming quite useless.

The plant is a noxious weed and should be destroyed as soon as it makes its appearance.

Pigeon Grass.

W.C.R. (Kilkivan)—

The specimen is one of the Pigeon grasses, *Setaria australiensis*. The Setarias are also sometimes referred to as Scrub Panicums, though *Panicum* is a botanical name of a restricted group of grasses. The term “Panicum” is sometimes used in agriculture to denote grasses which are distinct in a botanical sense from the genus *Panicum*. The Setarias make fairly good forage for stock.

Groundsel.

L.D. (Cooroy)—

The specimen forwarded is *Baccharis halimifolia*, the Groundsel Bush, a native of South America, now a common naturalised weed in coastal Queensland. It is particularly abundant on lands near the coast, and especially those subject to tidal inundation. Of recent years, however, it has spread on to scrub farms, and unless checked can become a very great nuisance. It was thought to be poisonous to stock, but feeding tests carried out at the Animal Health Station, Yeerongpilly, gave negative results. At the end of the experiment the animals fed on the plant were very emaciated, thus showing the plant to have no fodder value, but they recovered when put on to ordinary herbage.

“Dairy Grass,” “Elephant Grass.”

C.G.H. (Buneru, Dawson Valley)—

The specimen proved to be *Eriochloa punctata*, a native grass common in parts of Queensland. “Dairy Grass” and “Early Spring Grass” are two vernaculars that have been applied to it. There are several forms of it in Queensland, and most of them are excellent fodders.

Elephant Grass has considerable value as a stock fodder, and it not known to be poisonous or harmful at any stage of its growth.

Cheese Making.

J.W.R. (Toowoomba)—The Supervisor of Dairying, Mr. C. McGrath, advises:—

1. As milk for cheesemaking is paid for on the basis of its fat content, the addition of water to the milk would be of no advantage to a milk supplier.
2. The adding of water to the milk is detrimental to the cheese, owing to it causing interference with its curdling properties under the action of rennet. The quality of the water, if it is contaminated by bacteria may, moreover, seriously affect the quality of the cheese.
3. The lactometric test, which merely shows the specific gravity of the milk, is not a reliable test for added water in milk.
4. For the reasons given in answer to Question 2, water added to milk by one or several suppliers would be detrimental to the quality of the cheese made from it.

It may be mentioned that selling or supplying milk to which water has been added is an offence under both the Dairy Produce Act and the Health Act.

General Notes.

Staff Changes and Appointments.

Constable W. J. Ridge, Mourilyan, has been appointed also an Inspector under the Slaughtering Act.

The Officer in Charge of Police, Thangool, has been appointed also an Acting Inspector of Stock.

Mr. Leslie Wright, Curator of the City Council Nursery, at Cairns, has been appointed an Honorary Ranger under the Animals and Birds Acts and the Native Plants Protection Act, in respect of the Oyster Cay Sanctuary.

Mr. A. F. S. Ohman, Government Veterinary Surgeon, has been appointed also an Inspector under and for the purposes of the Brands Acts.

Mr. R. J. B. Barton, Habnarey Crossing, New Angledool, New South Wales, has been appointed an Acting Inspector under the Queensland Diseases in Stock Acts.

Mr. H. B. Carney, Ingham, has been appointed Chairman of the Macknade and Victoria Local Sugar Cane Prices Boards, *vice* Mr. J. A. Murray, resigned.

Constable H. Nuss, of Herberton, has been appointed also an Acting Stock Inspector.

Egg Board Election.

The following nominations have been received at the Department of Agriculture and Stock in connection with the election of five growers' representatives on the Egg Board:—

District No. 1 (Caboolture-Bundaberg).

Ronald Benjamin Corbett (Woombye). Returned unopposed.

District No. 2 (Brisbane North-Redcliffe).

Arthur Alfred Cousner (The Gap, via Ashgrove).

Henry Ernest Probert (Fig Tree Pocket, Indooroopilly).

District No. 3 (Brisbane South-Cleveland).

Tom Hallick (Mount Gravatt). Returned unopposed.

District No. 4 (Moreton).

Alexander McLauchlan (Boonah). Returned unopposed.

District No. 5 (Darling Downs).

Walter Thomas Hughes (Middle Ridge, Toowoomba).

Frederick Michael Proellocks (Wyreema).

The elections where necessary will be by postal vote, and the date fixed for the return of the ballot-papers is on or before the 28th April.

Canary Seed Board Election.

Following is the result of the Canary Seed Board election:—

George Burton (Cambooya) 145 votes.

Garrett Denis O'Neill (Allora) 121 votes.

Michael Coleman (Allora) 120 votes.

The elected members will hold office as from the 1st March, 1933, to the 31st May, 1934.

Pig Husbandry School.

Professor J. K. Murray, Principal of the Queensland Agricultural High School and College, Queensland, advises the intention of the college to arrange a further school of instruction to pig farmers some time during the winter months, if sufficient inducement offers. These schools have become very popular among those fortunate enough to attend, and as the fees charged really represent only a minimum for board and lodging, and as concession fares are available on the Queensland Railways to students attending the school, expenses are reduced to a minimum.

Those attending are assured of a really good and profitable time. Early application for particulars is advised. Address letters to the Principal, Queensland Agricultural High School and College, College Siding, Gatton, Queensland.

Citrus Levy Regulations.

Executive approval has been given to the issue of Regulations under "*The Fruit Marketing Organisation Acts, 1923 to 1930*," empowering the Committee of Direction of Fruit Marketing to make a levy for the purposes of the said Acts on all citrus fruits marketed for the year ending 28th February, 1934.

The Regulations provide that the levy shall be payable by growers of citrus fruits on the basis of the quantity of fruit marketed, and shall be at the following rates:—

1. Five shillings per ton on all citrus sold or consigned, whether by rail, road, or boat, to factories.
2. Three shillings and two pence, with a minimum of 1d., on all citrus sold or consigned by rail to any agent, person, or firm in Queensland, other than a factory.
3. One penny per case on all citrus sold or consigned other than by rail to any agent, person, or firm, except a factory.

The levy shall be deemed to have been made upon publication by the Committee of Direction of particulars of such levy.

All agents or persons who at any time hold moneys to the credit of growers shall pay to the Committee of Direction the amount of levy payable by the growers concerned.

The levy on all citrus railed from any Queensland railway station (other than Toowoomba, Townsville, Rockhampton, Central, Roma Street, Brunswick Street, Wooloongabba, and South Brisbane) to any other railway station in the State, may be collected by the Commissioner for Railways to the extent of 3s. 2d. per ton.

Subject to the above, and except as hereafter provided, the levy in the first instance shall be collected—

- (1) On all citrus sold or consigned to factories—
 - (a) If by rail, to the amount of 1s. 10d. per ton;
 - (b) If not by rail, to the amount of 5s. per ton.
- (2) On all citrus sold or delivered otherwise than by rail to any agent, person, or firm, other than a factory, at the rate of 1d. per case.

The levy shall be collected in the case of agents or persons other than the Committee of Direction or the Railway Commissioner, by means of levy stamps, obtainable from the Head Office of the Committee of Direction, Brisbane, which shall be affixed to account sales. Such agents or persons shall be entitled to deduct the value thereof from moneys held to the credit of growers, and levies so collected shall be paid to the Committee of Direction, Turbot street.

In the case of citrus fruits sold privately by the grower (that is, citrus not delivered to any agent or sent away by rail), the grower must furnish the Committee of Direction with a monthly statement of sales, and pay the levy at the Head Office.

If the amount of levy is not collected by the Railway Commissioner or by the agents or persons concerned, then without prejudice to the liability of the Commissioner or agent, such shall be payable by and recoverable as a debt from the grower.

Any agent, person, or firm who or which receives citrus fruits for sale on commission shall permit any authorised officer of the Committee of Direction to inspect their books and accounts.

The sums raised by the levy shall be expended in the interests of citrus-growing industry.

The levies on factory citrus and fresh fruit have been in force for some years past, and it was only last year that the arrangements with the Railway Commissioner to collect the levy on behalf of the Committee of Direction were entered into.

Slaughtering Regulations Amended.

Approval has been given to the amendment of a number of regulations under the Slaughtering Act. The amendments have reference to the use of the term "owner or occupier" when referring to the person in charge of a slaughter-yard or butcher's shop, and specify more definitely the "person" concerned.

A further amendment provides that fees for the inspection of carcases at slaughter-houses shall be paid on the last day of each month, instead of monthly or at shorter intervals as required by an inspector, as provided in the old Regulation. An addition also imposes a penalty up to £50 on an occupier who fails to pay such fees to an inspector within thirty days after same become due.

Honey Board Election.

The following nominations have been received at the Department of Agriculture and Stock in connection with the election of four growers' representatives on the Honey Board, namely:—

Roy John Bestmann (Caboolture);
 Alexander Roy Brown (Park Ridge);
 Charles William Edwards (Greenbank, via Kingston);
 Henry Edgar Fagg (South Killarney);
 John Schutt (Holstein Park, Perthton);
 Owen Norman Tanner (Samford); and
 George Herbert Whiting (Coowoonga, via Rockhampton).

The election will be by postal vote and the ballot-papers are returnable to the Department not later than the 10th April.

Sanctuaries Proclaimed.

Orders in Council have been issued under the Animals and Birds Acts declaring as sanctuaries the G.W. Swamp, situated on Gunnawarra Station, Mount Garnet, and Malvern Downs and Talagai Holding, near Capella. Talagai was declared a sanctuary in 1928, but its boundaries have now been altered, and the new sanctuary includes Malvern Downs. It will be unlawful for any person to take or kill any animal or bird on these properties.

Stallion Districts.

A proclamation under the Stallions Registration Acts has been issued, and provides for the abolition of existing stallion districts, and for the creation of nine new districts in which the provisions of the Acts shall be in force. These embrace the East Moreton, West Moreton, Darling Downs South, Darling Downs North, Wide Bay, Burnett, Central Coast, Northern Coast, and Northern Districts.

Sugar Mill Suppliers' Committees.

Executive approval has been given to the issue of an Order in Council under the Primary Producers' Organisation and Marketing Acts, which alters the list of Mill Suppliers' Committees appearing in the Act by providing for the deletion of the Homebush-Farleigh, Childers, Alberton, Carbrook, and Stegelitz Mill Suppliers' Committees. The Homebush-Farleigh Mill Suppliers' Committee is now part of the Racecourse Mill Suppliers' Committee, and the Childers sugar mill having ceased to function, the Childers Committee has become part of the Isis Central Mill Suppliers' Committee.

Banana Industry Protection Board.

A Regulation has been issued under "*The Banana Industry Protection Act of 1929*," which provides that for the period until the 30th September, 1933, the two growers' representatives on the Banana Industry Protection Board, in lieu of election, shall be nominated by the Committee of Direction of Fruit Marketing from the Banana Sectional Group Committee. Messrs. A. E. Maher (Cooran) and K. H. Hack (Nerang) have accordingly been appointed Growers' Representatives on the Board until 30th September, 1933.

Maturity Standard for Apples.

Executive approval has been given to an amendment of Regulation No. 3 under "*The Fruit and Vegetables Act of 1927*," which prescribes a new maturity standard for apples. Matured fruit, therefore, in the case of apples, will mean when, in the opinion of an inspector, the fruit has attained its full growth as indicated by the normal ripe colour of the skin of the variety, and matured its seeds as indicated by these having changed from white to a brown colour.

Financial Statements by Butter and Cheese Factories.

A Regulation has been issued under "*The Dairy Produce Acts, 1920 to 1932*," which provides that an owner of a butter or cheese factory shall, on or before the 30th September in each year, supply to the Minister copies of financial statements, which shall be for the year ending on the preceding 30th June. These statements shall be in the form and contain the particulars prescribed in the Schedule to the Regulation. A certificate of correctness signed by the auditor of the factory's books must be appended to the statements.

Rural Topics.

A Queensland Cattleman Abroad.

Cunnamulla Charley, the seasoned hero of dozens of Queensland cattle-drafting competitions, whose steer-handling feats are the glory of the stations from Boulia to the Downs, and whose buckjumping is epic, has been for a trip to the United States, whither he had gone to see what real rodeos and Texan "long-horns" were like. Cunnamulla Charley is quite disillusioned regarding the much-written about marvels of the Yankee cattle camps. "I never saw a real scrub steer, as we understand it, all the time I was away! Their beasts are as spiritless as a Yandina dairy cow, and they'd do no good at an Esk cattle draftin' unless it was as runners-up in a cud-chewing competition. That 'ud be about their weight!"—The "Brisbane Courier."

Lucerne as a Soil Renovator.

"If you grow lucerne as a rotation crop you can, even after forty years, leave your farm to your sons in just as rich a condition—perhaps richer—than when you originally purchased it," observed Mr. A. S. Pankhurst, of Singleton, in advocating the growing of this crop at a recent farmers' conference. It was not only a most valuable soil renovator, said the speaker, but it produced such a bulk of nourishing fodder that was capable of being conserved for such a lengthy period that it could could with every justification be called the king of fodders.

Importance of Stirring Cream.

Stirring of cream two or three times daily helps to maintain it in good physical condition and to liberate any gas which may form. If the cream is left standing for hours before stirring there is a tendency for the heavy portion (casein, &c.) to gradually settle towards the bottom and for the fat to rise to the top, especially if the cream is inclined to be thinly separated. This is not desirable, and stirring will prevent it.

A tinned steel or tinned copper stirrer should be used; on no account should a wooden stirrer be employed for this purpose.

A Whitewash Formula.

A whitewash suitable for many purposes on the farm can be made as follows:—

Obtain, if possible, large pieces of fresh lump lime, place them in a very large bucket or other suitable container, and into this pour hot water. Cold water will do, but hot water is better as it hastens the slaking. The lime will start to boil and break up. Keep it covered all the time with about half an inch of water. This is important, for if whilst the lime is slaking it is allowed to rise above the water in a dry powder it will "curdle." Before the lime commences to boil fiercely, add tallow or common fat in the proportion of about 1 lb. to 14 lb. of lump lime. This makes a good binder which will prevent the wash from rubbing off. If desired, a little yellow ochre may also be added, which will give a cream or buff tint according to the quantity used. When the lime is thoroughly slaked it should be stirred and sufficient water added to make it a little heavier than, say, milk, after which it should be strained, and, if desired, may be applied whilst hot.

Green Feed for Poultry.

Succulent green feed, chaffed up for preference, should be given daily to poultry, preferably at midday. If a little pollard is mixed with it, and it is wet, the green stuff is eaten up more readily. Among the best crops to use are lucerne, Bokhara clover, barley, rape, chou moulrier, thousand-headed kale, and green maize while young and tender. This range of green crops will provide feed throughout the whole year.

Wood Ashes as Fertilizer.

The value of wood ashes as a fertilizing material is not as widely known as it deserves to be. In newly-cleared country this valuable substance is produced in large quantities, and it will be found to more than repay the trouble of returning it to the land. It is a matter of common observation that after a bush fire the vegetation is particularly strong and luxuriant, and the effect is due largely to the lime, potash, and phosphoric acid thus returned to the soil. The household wood fires also furnish a small but constant supply of ashes which should be all kept and made use of. They may be utilised, either by themselves or mixed with other manures, or added to the compost heap—a valuable adjunct to the economy of the farm.

Snakes—What to do if Bitten.

All people whose daily routine is likely to bring them in contact with snakes should see that the following articles are with them or in a handy place:—(1) Crystals of permanganate of potash; (2) a sharp knife, razor, or lance; (3) some cord or elastic that can be used as a ligature. Immediately following the bite of a venomous snake—the sooner the better—a ligature must be placed above the bite marks on the side nearest the heart (writes J. R. Kinghorn in Melbourne "Argus"). This ligature must be twisted until the patient thinks his finger or arm or leg is being cut in two, a painful but necessary operation.

If the bite is on a finger or toe the ligature can be applied to that member, as near to the hand or foot as possible, provided room is left to enable the operator to work at the punctures. If the bite is on the wrist or forearm or calf of the leg the ligature must be placed above the elbow, or knee, where there is only one bone, thereby enabling the blood flow to be checked.

As soon as this is done wipe away any venom or saliva that may be on the surface of the skin, then make deep longitudinal cuts through each fang puncture; these should be deeper than the punctures. Into these cuts force some crystals of permanganate, then squeeze the wound to force out as much of the poisoned blood as possible. If there are no cracks, cuts, or abrasions on the lips or in the mouth of the operator he may safely suck the wound, washing the mouth with a weak solution of permanganate the while. If any venom is accidentally swallowed, no harm will result if a little weak permanganate solution is swallowed and as long as the stomach is healthy and free from inflammation.

If the bite is on a part of the body where a ligature cannot be applied—the face, for example—do not place a ligature round the neck, but as much of the above treatment as possible must be faithfully adhered to. As soon as the first-aid treatment is completed, send for or take the patient to a doctor, and if he finds the treatment has been "well done" he will know that his chance of pulling the victim through has been greatly enhanced.

If no doctor is available the ligature must be loosened at the end of about half an hour to lessen the danger of complications setting in; it must be loosened for a minute or so, and then tightened again, and the performance repeated again after about fifteen minutes, and again after fifteen minutes more, and so on, removing it altogether after the third or fourth operation.

Do not go to the extremes of cutting off a finger or toe—the result might be worse than that of the bite. Do not beat a patient to keep him awake, or do not walk him about and tire him. Complete rest is essential, and a stimulant, such as coffee or a little alcohol, should be given. Alcohol, ammonia, &c., either applied to the wound or taken internally, have no curative effect whatsoever. Only small doses should be given; large doses are dangerous, as they dull the nerves or quicken the circulation, both of which should be avoided.

Treatment.

1. Apply ligature to localise the effects of venom.
2. Wipe venom or saliva from surface of wound.
3. Cut the flesh to drain away poisoned blood.
4. Apply permanganate.
5. Squeeze or suck the wound.
6. Send for a doctor.

The doctor is placed last merely because every second is valuable, and first-aid treatment must not be delayed.

Bites from non-venomous snakes may be washed with a solution of permanganate of potash, and hot fomentations applied to the wound. Unless one makes a close study of snakes it may be difficult for the layman to determine at a glance a non-venomous from a venomous snake. The bite marks differ considerably, though occasionally there may be a few small punctures or scratches behind the large fang marks of a venomous snake bite; so for safety's sake all unknown species had better be regarded as venomous unless the bite marks distinctly show it to be harmless.

Finally, remember this—do not reach into a hollow log or a rabbit burrow, even though you saw a rabbit enter, because very often a tiger or brown snake is there also, and it will get your hand before you get the rabbit.

Sheep and Wheat.

Sheep must be regarded as indispensable on the wheat farm. They are valuable not only as an important and reliable source of income but as part of the working plant of the farm for the control of weeds, &c.—their indirect value is frequently of greater importance than the cash return. It is essential to the success of the crop that the farmer have on his holding as many sheep as possible, compatible with the most economical use of the land for wheat production.

Sheep are valuable on the following grounds:—

They consume and turn to profit the straw left after the harvest.

They turn weeds to profit and prevent them from seeding at times when the farmer is unable to deal with them, owing to pressure of other work.

Their manure improves the fertility of the land.

When the season is so bad that the crops fail to produce grain, sheep turn them to profitable account.

The income from the farm is rendered more certain, as the farmer does not then depend entirely upon a crop that may be destroyed by fire or hail.

Sheep necessitate the adoption of a rotation, which tends to improve the fertility of the land and to increase the yields of the crops.

They can be used to feed off crops that need such a check.

A supply of cheap mutton is made available for the farmer's own household.

To these advantages might be added the pride and pleasure derived by a farmer from the possession of a good flock.—A. and P. Notes, N.S.W. Dept. Agric.

Watering Horses—Important Points.

Horses require anything from 5 to 15 gallons of water a day, the quantity depending on the temperature and the amount of work performed. The water should be as pure as possible, clear in appearance, and free from taste, colour, or smell. Pure water is just as essential to a horse as it is to a man, and it is a mistake to suppose that a horse can drink badly contaminated water with impunity. Water obtained from pools or shallow wells, contaminated with surface drainage, or containing decomposing organic matter, frequently causes diarrhoea, and generally predisposes to colic. Water that contains a large amount of sediment should not be given, as the sediment causes a mechanical irritation of the mucous membrane of the stomach and intestines—i.e., sand colic.

When the horse is at rest in the stable, water should be given three times a day, and should invariably be given previous to feeding. This latter point is of considerable practical importance. A horse's stomach is small in proportion to the animal's size, and water does not remain in it, but passes through the stomach and small bowel to the cæcum, or water-gut. If water is given after feeding, besides weakening the digestive juices, a considerable portion of the food in the stomach and small intestines will be washed out in an undigested state, and indigestion and colic may result. Water in small quantities can be given within an hour or so from the completion of feeding if desired.

After a long journey, a good plan is to water a mile or so before the journey's end, and take the horse slowly in afterwards. This prevents chills and colic, due to the ingestion of a large quantity of water when in an exhausted state. An animal after prolonged exertion or fast work has his system depleted of fluid. He will not eat sufficiently until his thirst has been satisfied; therefore the water should come first, and while the animal is still warm is the best time to give it. After standing, the body temperature falls, and to give cold water freely then is only to intensify the effect of the cold water on the system.

Danish Pig Carcases.

Arrangements are being made by the Royal National Agricultural and Industrial Association of Queensland to exhibit at their coming exhibition in August, 1933, frozen carcases of pigs for bacon typical of those most favoured on the British markets, representative of the class of product imported from countries other than Australia. The objective is to secure also data concerning these carcases—weight, breeding, feeding, &c.—and to display them alongside specially selected Australian carcases. Negotiations are in train with a shipping company for refrigerated space to bring such carcases to Brisbane in time for the show. It is considered that a display of this type would provide the Queensland grower with excellent opportunity to sum up requirements of the overseas bacon trade.

Lucerne—Rate and Method of Sowing.

The quantity of seed necessary when sowing lucerne varies. In the regular lucerne districts of the State from 12 lb. to 15 lb., and even 20 lb., per acre is applied. For dry districts, such as the Riverina, 6 to 8 lb. will be found quite sufficient if evenly applied. For grazing purposes in dry districts 2 to 3 lb. seed per acre is ample.

It is not wise to run the risk of a thin crop through a little parsimony in seeding. It is all-important, with a permanent crop such as lucerne, that a good stand should be obtained at the outset. Re-seeding cannot be done without again breaking up the land, and this means that a year or more is lost. If re-seeding is not done, the yields are permanently affected through the poor stand. Attempts are sometimes made to remedy unsatisfactory stands by sowing further seed, but they are seldom successful. The soil is not in a receptive condition, and what plants do grow have to contend with established vigorous plants.

At the same time it is a mistake to endeavour to remedy defects in preparation, or in the state of the soil, by heavier seeding. Favourable conditions are required to promote germination and help the young plant, and seeding should only be done after they have been obtained. If the ground should happen to be dry at seeding time, heavier seeding will not secure a proper stand.

Farmers generally prefer to broadcast the seed where the area is small, but sowing through the grass seed attachment of the wheat drill is a useful method when the area is larger.

A method of sowing that is well suited for wheat districts is to mix thoroughly just prior to sowing 70 lb. of superphosphate with the lucerne seed, and put the mixture into the manure box of an ordinary seed drill, or the combine. The discs or hoes of the drill should not be set into the soil too deeply. Some drills, especially when new, cannot be set to a shallower depth than $1\frac{1}{2}$ to 2 inches; in such a case a good plan to follow is not to set the lever of the drill into the first notch but to let it dangle. The cogs of the drill will be in gear, but the hoes will not go down as deeply as if the lever had been set into the first notch. In this way the seed will be sown about $\frac{3}{4}$ inch deep.

Only a small quantity of the mixture should be put into the fertiliser box at a time—it should not be filled right up. In order that the seed may be thoroughly covered, it is advisable to attach a light tine harrow or brush harrow to the back of the drill. An even distribution of the seed is required, and although some farmers are sufficiently expert to obtain it by hand-sowing, this method is not recommended to the inexperienced. Many good hand-broadcasting machines are available which do the work satisfactorily.

If a farmer is compelled to resort to hand-broadcasting, half the seed should be sown in one direction across the paddock and the other half at right angles across the first cast, so that strips missed the first time will receive some seed. A calm day or early morning should be selected, as it is hard to distribute the seed evenly on a choppy, windy day. The seed should be covered with a light harrow, though a brush harrow is often used. Adjustable lever harrows are very effective for this work, as the depth can easily be regulated. The seed should not be covered deeply, and precautions must be taken to prevent a crust forming on the surface.—A. and P. Notes, N.S.W. Dept. Ag.

Money in Pigs.

The total amount paid to pig suppliers from inception of the company to the end of 1932 by Norco Co-operative Association, Limited, Byron Bay, New South Wales, represents an expenditure of £2,782,207 18s. 8d.

The largest number of pigs treated in one year was 53,552, the supply for the year 1932, approximately 3,000 more pigs than in previous year, representing approximately ten times the number per year in comparison with the first year's supply, that of 1895, when but 5,070 pigs were killed.

Up to the end of 1932, 1,013,216 pigs had been killed at Norco's factory with business still at a very high level, despite the fact that the prices paid in 1932 were the lowest for many years. An average price of 4.89d. per lb. was paid for A1 pork with a further distribution of $\frac{1}{2}$ d. per lb. on all A1 and No. 1 grades for the half-year; the bonus for the previous half-year already had been paid.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

LESSONS IN MOTHERCRAFT.

RECENTLY a class of High School girls watched a demonstration given by the matron of one of the New Zealand Karitane Hospitals and a group of Karitane nurses. The demonstration illustrated the bathing and dressing of a normal baby, the making of the cradle and putting the baby to bed, and it was followed by a talk from the matron about the simple essentials needed for keeping the well baby well. Afterwards a prize was offered for the best essay on the lesson. How readily and thoroughly mothercraft teaching like this is understood and assimilated is well illustrated by the essay which we print. Hardly a point has been missed. Time and again this fact is brought home. One wonders how long we shall continue to have our girls prepared for almost every conceivable profession or occupation except the only one which the majority will be called upon to practise—motherhood, “woman’s exclusive profession.”

ESSAY BY HIGH SCHOOL GIRL.

On Wednesday the matron of the Karitane Hospital, assisted by three Karitane nurses, gave us a very interesting and beneficial lecture and demonstration on the correct method of bathing and clothing baby and preparing his bed.

Bathing the Baby.

Before bathing baby, one should have all the appliances at hand, so that there will be no delay, thus causing unnecessary exposure of the skin. If one has not a bath thermometer to test the heat of the water, dip the elbow into the water, and if the heat is comfortable for the elbow it is the correct temperature for bathing baby. Wash baby’s face gently with a cloth, using no soap; dry thoroughly. Then, using as little soap as possible, wash the head and the body; then gently lower baby into the bath and wash the soap off. Bathing time is not a play-time, and the bathing should not be delayed or the baby played with during this time, as delays are dangerous, and through exposure baby may contract a serious cold.

When baby is taken out of the bath, he should not remain exposed, but should be dried quickly with gentle dabbing movements rather than rubbing. Great care should be exercised in the drying of the eyes, ears, and folds of the skin. When baby is dried, a little powder, although unnecessary, may be applied at the mother’s discretion, but it should be used in small quantities, as it will close the pores of the skin if too much is used. After baby becomes older the bathing water should gradually be decreased in temperature so that in time he may be able to have a cold sponge or bath.

The correct time to bath baby is just before his 10 a.m. meal or his first meal for the day; but if this cannot be managed, at least one hour should elapse after feeding-time before baby is bathed. A cosy corner in the room should be chosen for bathing purposes, and, if necessary, a draught screen should be used.

What the Baby should Wear.

After baby is bathed he should be dressed immediately. Baby should never wear flannel next to his skin, because it is of rough texture and it is irritating, often causing chafing and the outbreak of rashes. All the garments should be hung from the shoulders, and not from the waist. Elastic bands should never be made use of, because they tend to stop the circulation and sometimes cause deformities.

A thin, soft, porous cotton material should be worn next to the skin, then a soft woolly shirt, then a flannel petticoat of the cheapest quality, as the cheaper flannels are more open in the weave and are not so liable to shrink when washed. a loose flannel dress or some other open material, and, lastly, a little flannel jacket. These garments give the mother plenty of scope for her artistic sense. The amount of clothing worn by baby should be regulated by the mother according to the warmth or coldness of the atmosphere. A bib of some absorbent material is essential, otherwise baby would be soaked in no time. The napkin, made preferably of towelling, should be loose, but not bulky, and only one should be used, as bulkiness causes deformities. There should be no space for the chilly air to enter between the napkin and the singlet. In cold weather, or if baby is delicate, flannel booties and gloves should be used to prevent chills. All the Karitane patterns for baby's clothes are simple, loose, flowing garments, and easily made.

The Baby's Bed.

The preparation of baby's bed is highly important, as baby in his early stages requires plenty of sleep, which he cannot obtain if his bed is uncomfortable.

A wicker basket cradle is perhaps the best type of bed. At the head of the cot is the head blanket, and on top of this the enveloping blanket; on this rests the mattress. If a hot bottle is necessary, it should be placed on top of this mattress to prevent any chance of accident. On top of this is placed a loose chaff mattress, composed of about 4 lb. of chaff. The casing can be washed if it is at any time soiled. Into this baby nestles, whilst the hard mattress prevents deformities and helps to strengthen baby's back. On the chaff shakedown should be placed a small piece of old flannel blanket. The pillow, also made of chaff (about $\frac{1}{2}$ lb. to 1 lb.), should then be placed at the head of the cot. Baby's clothes should then be neatly folded back, and he should then be laid on his side in the bed. Over him should be placed another blanket, which should be tucked neatly and snugly around him. Then the two sides of the enveloping blanket should be tucked securely under the mattress; the end should be turned up neatly so as to form a cosy bed. Over this is placed a dainty quilt. Baby should then be left to sleep in the open air. If this is not possible, he should be put in a large, airy room.

TREATMENT OF THE ONLY CHILD.

In giving advice about the treatment of the only child for application in the home, we need to consider whether that home is in the city, small town, or isolated in the "outback."

There are two main points that parents should remember—first, that all educationists and psychologists, who differ on many points, agree on one, namely, that the main time for forming character is before six years of age. After that, training and environment still count, of course, but not to the same extent.

The second point refers especially to the only child, or one leading the life of the only child, and is, that man is a social being.

Companionship Necessary.

Companionship with children of his own age, or better still, of his own stage of development, is a necessary part of a child's life. Without it he may become mal-adjusted, the usual term being a "spoilt child." Adjustment really means the natural process of learning the law of "give and take," forming the ability to take part as a harmonious unit in a crowd, gaining judgment and balance, taking a few hard knocks without running to elders for help; in fact, as men put it, "getting the rough edges taken off." What a vitally important part of the training of a young child it is! In the light of future citizenship, it means that the plastic child is learning to co-operate, to work for the good of the whole community, and to gain a grasp of the great law of interdependence, which, if every small child in every nation could gain it, would stop war. The kindergarten graduate is thinking of these great principles when she guides a tiny tot of three years to see that, instead of fighting another child about who will have a certain part of the floor to build a train, it is much better for one child to build the train while the other builds a station and goods-shed. Thus erstwhile opponents share the coveted area in harmonious, constructive activity for a common end. Yet the average adult, watching this scene, would call it "only play." Outside kindergarten a small boy can often grasp the law of interdependence by being shown what a joy it is when daddy's

car, having broken down on the road, several other motorists stop and help him. You will find many other instances—remember the great principles involved and use them.

In the City.

The best solution of the "only child" problem in a city is to send him to a nursery school or kindergarten, if for only three hours every morning. The graduate in charge will have, or should have, at her finger-tips the psychological knowledge to treat the so-called difficult child, or the child who clings too much to mummy, the excitable child, the nervous one, the anti-social boy, &c. One of the main things inculcated being warm love of parents and home, no emotional separation of child and home takes place—quite the reverse. And the mother gets a rest.

In the Country Town.

In the case of the child in a small country town, there is often no graduate practising there, and the available children may be considered undesirable. In this case, social development being most important for your child, I should advise your having these children in to play, but staying yourself near the group—quite unostentatiously, of course. Soon you will find lovable points in those other children, and if you are wise enough to play just a little with them, or tell them a story, or have some nursery rhymes, how they will love you. You may need to correct mistakes in your child's speech, as one result of this companionship, but perfect English is not maintained under normal circumstances anywhere while children are young and imitative; mistakes in grammar, even "swearing" appear for short intervals in all well-conducted homes and schools; children love to imitate anything new.

In the Bush.

For the parents of a solitary child in the far bush, there is one main solution of the problem—the mother or guardian must give up much time, at the cost of some other duties, to give the child companionship. But the companionship must aim at strengthening, not weakening, the child. Let all games, all "jobs," all enjoyments keep as near a fifty-fifty basis as possible. Train the child to be a "good loser." Develop responsibility by letting him keep pets and have entire control of their welfare. For mental culture, good books with clear pictures are essential, but see that he does not get too many stories or he will become a dreamer, and, later, will find normal life hard. Handwork, be it connected with small house duties, carpentry, drawing, or other activities, is useful in helping to keep the only child practical. Aim always at turning his thoughts outwards, away from himself. Any creative work should be steadily encouraged; finishing things started is an important part of efficiency, so guide him to start only things simple enough to finish. A pair of parallel bars for gymnastics has often helped an only child to get physical fitness; he needs muscular strength and the power of self-defence developed. Above all, if the parents co-operate and "pull together," then wherever the only child may be living he has the greatest help of all—the unified harmonious home.

PORK RECIPES.

Pork Chops Grande.

Allow one pork chop for each person, fry in the usual way and, while frying, prepare two onions peeled and sliced, two sticks of celery finely sliced. Fry in one dessertspoonful of butter. When cooked add two well-beaten eggs and half a cupful of milk. Stir for a few seconds. Place the chops, well drained, on a hot dish and pour savoury around. Serve with mashed potatoes or rice.

Pork Pie.

Take 1 lb. minced pork, 1 pig's foot (for jelly), and prepare as follows:—Take 1 lb. self-raising flour, melt $\frac{1}{2}$ lb. lard, pour over flour and work into a dough. Line a cake tin, fill with minced pork, and cover with remaining dough. Bake in moderate oven for one hour. Cover pig's foot with water, bring to boil, and allow to simmer for one and a-half hours. Strain and season to taste. Allow stock and pie to cool a little, then pour pig's foot stock into the pie and allow to cool and set.

This is a very nice dish and is readily prepared. If available, two pig's feet may be used instead of one to provide for a richer stock and jelly.

Orchard Notes for May.

THE COASTAL DISTRICTS.

IN these notes for the past two months the attention of citrus-growers has been called to the extreme importance of their taking every possible care in gathering, handling, packing, and marketing, as the heavy losses that frequently occur in Southern shipments can only be prevented by so treating the fruit that it is not bruised or otherwise injured. It has been pointed out that no citrus fruit in which the skin is perfect and free from injury of any kind can become speckled or blue-mouldy, as the fungus causing the trouble cannot obtain an entry into any fruit in which the skin is intact. Growers are, therefore, again warned of the risk they run by sending blemished fruit South, and are urged to exercise the greatest care in the handling of their fruit. No sounder advice has been given in these notes than that dealing with the gathering, handling, grading, packing, and marketing, not only of citrus, but of all other classes of fruit.

It is equally as important to know how to dispose of fruit to the best advantage as it is to know how to grow it. To say the least, it is very bad business to go to the expense of planting and caring for an orchard until it becomes productive and then neglect to take the necessary care in the marketing of the resultant crop. Main crop lemons should be cut and cured now, instead of being allowed to remain on the tree to develop thick skins and coarseness. As soon as the fruit shows the first signs of colour or is large enough to cure down to about from $2\frac{1}{4}$ to $2\frac{1}{2}$ inches in diameter, it should be picked, care being taken to handle it very gently, as the secret of successfully curing and keeping this fruit is to see that the skin is not injured in the slightest, as even very slight injuries induce decay or specking. All citrus fruits must be sweated for at least seven days before being sent to the Southern States, as this permits of the majority of specky or fly-infested fruits being rejected. Citrus trees may be planted during this month, provided the land has been properly prepared and is in a fit state to receive them; if not, it is better to delay the planting till the land is right.

In planting, always see that the ground immediately below the base of the tree is well broken up, so that the main roots can penetrate deeply into the soil and not run on the surface. If this is done and the trees are planted so that the roots are given a downward tendency, and all roots tending to grow on or near the surface are removed, the tree will have a much better hold of the soil and, owing to the absence of purely surface roots, the land can be kept well and deeply cultivated, and be thus able to retain an adequate supply of moisture in dry periods. Do not forget to prune well back when planting, or to cut away all broken roots.

All orchards, pineapple and banana plantations should be kept clean and free from all weed growth, and the soil should be well worked so as to retain moisture.

Custard apples will be coming forward in quantity, and the greatest care should be taken, to see that they are properly graded and packed for the Southern markets, only one layer of one-sized fruit being packed in the special cases provided for this fruit—cases which permit of the packing of fruit ranging from 4 to 6 in. diameter in a single layer.

Slowly acting manures—such as meatworks manure—may be applied to orchards and vineyards during the month; and lime can be applied where necessary. Land intended for planting with pineapples or bananas during the coming spring can be got ready now, as, in the case of pineapples, it is a good plan to allow the land to lie fallow and sweeten for some time before planting; and, in the case of bananas, scrub fallen now gets a good chance of drying thoroughly before it is fired in spring, a good burn being thus secured.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

CLEAN up all orchards and vineyards, destroy all weeds and rubbish likely to harbour fruit pests of any kind, and keep the surface of the soil well stirred, so as to give birds and predaceous insects every chance to destroy any fruit fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Further, it is a good plan to clean up the land before pruning takes place as, if delayed till the pruning has been finished, the land is apt to dry out.

Pruning can be started on such varieties as have shed their leaves towards the end of the month, as it is a good plan to get this work through as early in the season as possible, instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—not vines, as the later vines are pruned in the season the better in the Granite Belt district, as late-pruned vines stand a better chance to escape injury by late spring frosts.

All worthless, badly diseased, or worn-out trees that are no longer profitable, and which are not worth working over, should be taken out now and burnt, as they are only a menace and a harbour for pests.

Land intended for planting should be got ready as soon as possible, as, if ploughed up roughly and allowed to remain exposed to the winter frosts, it will become sweetened and the trees planted in it will come away much better than if set out in raw land. In any case the land must be properly prepared, for once the trees are planted it is a difficult matter to get the whole of the land as well worked as is possible prior to planting.

Slowly acting manure—such as ground island phosphates or basic phosphates—may be applied to orchards and vineyards. They are not easily washed out of the soil, and will become slowly available and thus ready for use of the trees or vines during their spring growth. Lime may also be applied where necessary.

This is a good time to attend to any drains—surface, cut-off, or underground. The two former should be cleaned out, and in the case of the latter all outlets should be examined to see that they are quite clear and that there is a good getaway for the drainage water. New drains may also be put in where required.

In the warmer parts citrus fruits will be ready for marketing, and lemons ready for cutting and curing. The same advice that has been given with respect to coast-grown fruit applies equally to that grown inland; and growers will find that careful handling of the fruit will pay them well. Lemons grown inland are, as a rule, of superior quality to those grown on the coast, but are apt to become too large if left too long on the trees, so it is advisable to cut and cure them as soon as they are ready. If this is done and they are properly handled, they may be kept for months, and will be equal to any that are imported.

If the weather is very dry, citrus trees may require an irrigation, but, unless the trees are showing signs of distress, it is better to depend on the cultivation of the soil to retain the necessary moisture, as the application of water now is apt to cause the fruit to become soft and puffy, so that it will not keep or carry well.

Land intended for new orchards should be got ready at once, as it is advisable to plant fairly early in the season in order that the trees may become established before the weather again becomes hot and dry. If the ground is dry at the time of planting, set the trees in the usual manner and cover the roots with a little soil; then give them a good soaking; and, when the water has soaked into the soil, fill the hole with dry soil. This is much better than surface watering.

Farm Notes for May.

FIELD.—May is usually a busy month with the farmer—more particularly the wheatgrower, with whom the final preparation of his land prior to sowing is the one important operation. Late-maturing varieties should be in the ground by the middle of the month at the latest.

Clover land, intended primarily for feeding off, should be sown not later than the end of April.

The necessity of pickling all wheat intended for sowing purposes is again emphasised; and for general purposes, combined with economy in cost of material, the bluestone and lime solution holds its own. To those who desire an easier but somewhat more costly method of treatment, carbonate of copper at the rate of 1 oz. to the bushel and used in a dry form is suggested.

Potatoes, which in many districts are still somewhat backward, should have by this time received their final cultivation and hilling-up.

The sowing of prairie grass on scrub areas may be continued, but should be finished this month. This is an excellent winter grass, and does well in many parts of Southern Queensland.

Root crops, sowings of which were made during April, should now receive special attention in the matter of thinning out and keeping the soil surface well tilled to prevent undue evaporation of moisture.

Every effort should be made to secure sufficient supplies of fodder for stock during the winter, conserved either in the form of silage or hay.

Cotton crops are now fast approaching the final stages of harvesting. All consignments to the ginnery should be legibly branded with the owner's initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.



PLATE 39.—WATERFORD SHIRE.—BRISBANE—MOUNT LINDESAY ROAD.
Jerry's Downfall Section—showing a cement penetration floodway.

(Photo.: Main Roads Commission.)

CLIMATOLOGICAL TABLE—FEBRUARY, 1933.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	SHADE TEMPERATURE.						RAINFALL.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
<i>Coastal.</i>	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29.79	88	74	95	21	72	3, 5, 6, 8, 9, 16	2,860	18
Herberton	..	79	65	86	26	61	25, 26	1,327	20
Rockhampton	29.85	89	73	96	21	68	4, 5	167	6
Brisbane	29.89	86	67	98	13	60	23	244	4
<i>Darling Downs.</i>									
Dalby	29.87	89	63	102	14	48	22	296	5
Stanthorpe	..	82	56	96	14	42	22, 23	140	4
Toowoomba	..	83	59	97	14	46	22	258	4
<i>Mid-interior.</i>									
Georgetown	29.75	88	72	97	26	68	9	549	18
Longreach	29.78	95	70	105	25	63	8	163	5
Mitchell	29.84	93	65	103	24, 13	48	22	152	2
<i>Western.</i>									
Burketown	29.75	87	76	99	26	70	4, 7, 8	843	14
Boulia	29.77	95	70	104	10, 25, 26, 28	64	22	496	6
Thargomindah	29.82	96	72	110	12	63	21	7	1

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING FEBRUARY, 1933 AND 1932, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Feb.	No. of Years' Records.	Feb., 1933.	Feb., 1932.		Feb.	No. of Years' Records.	Feb., 1933.	Feb., 1932.
<i>North Coast.</i>	In.		In.	In.	<i>South Coast—continued—</i>	In.		In.	In.
Atherton	10.08	32	19.22	6.21	Nambour	9.73	37	4.65	5.25
Cairns	15.24	51	32.75	3.68	Nanango	4.15	51	2.44	1.25
Cardwell	10.77	61	17.74	1.51	Rockhampton	7.78	62	1.67	1.33
Cooktown	13.37	57	28.60	5.63	Woodford	8.60	46	3.70	2.15
Herberton	7.62	47	13.27	3.11					
Ingham	15.97	41	18.17	3.50	<i>Darling Downs.</i>				
Innisfail	21.99	52	41.68	4.36	Dalby	2.86	63	2.96	0.60
Mossman Mill	17.01	20	26.46	5.12	Emu Vale	2.58	37	1.52	2.40
Townsville	11.12	62	10.03	2.19	Jimbour	2.64	45	2.59	0.35
<i>Central Coast.</i>					Miles	2.73	48	1.88	0.26
Ayr	8.88	46	7.89	2.80	Stanthorpe	3.24	60	1.40	1.05
Bowen	8.64	62	9.67	1.11	Toowoomba	4.53	61	2.58	1.29
Charters Towers	4.36	51	6.34	0.15	Warwick	3.10	68	2.02	0.92
Mackay	11.25	62	19.86	2.94					
Proserpine	11.90	30	12.68	3.90	<i>Maranoa.</i>				
St. Lawrence	7.88	62	1.86	4.28	Roma	2.97	59	0.98	0.11
<i>South Coast.</i>									
Biggenden	4.40	34	1.95	1.91	<i>State Farms, &c.</i>				
Bundaberg	6.43	50	4.90	0.61	Bungewongorai	2.22	19	0.83	0.12
Brisbane	6.30	82	2.44	0.70	Gatton College	3.46	34	2.89	1.11
Caboorture	7.83	46	3.62	1.50	Gindie	2.79	34	0.53	0.50
Childers	6.61	38	4.15	0.96	Hermitage	2.52	27	..	0.80
Crohamhurst	13.17	40	4.08	3.33	Kairi	9.35	19	..	3.56
Esk	5.55	46	3.93	2.49	Mackay Sugar Ex-				
Gayndah	4.25	62	1.71	0.52	periment Station	10.10	36	20.92	2.00
Gympie	6.71	63	3.35	3.27					
Kilkivan	4.94	54	1.39	1.15					
Maryborough	6.61	61	5.38	1.35					

GEORGE E. BOND, Divisional Meteorologist.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

	April, 1933.		May, 1933.		Apr., 1933.		May, 1933.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6-5	5-47	6-22	5-17	a.m.	a.m.	11-19	11-40
2	6-6	5-46	6-22	5-16	p.m.	p.m.	12-13	12-24
3	6-6	5-45	6-23	5-15	12-59	1-1		
4	6-7	5-43	6-23	5-15	1-47	1-33		
5	6-7	5-42	6-24	5-14	2-27	2-5		
6	6-8	5-41	6-24	5-14	3-4	2-37		
7	6-8	5-40	6-25	5-13	3-37	3-8		
8	6-9	5-39	6-25	5-12	4-8	3-45		
9	6-9	5-38	6-26	5-11	4-41	4-24		
10	6-10	5-37	6-26	5-11	5-16	5-11		
11	6-10	5-36	6-27	5-10	5-52	6-10		
12	6-11	5-34	6-27	5-10	6-33	7-14		
13	6-12	5-33	6-28	5-9	7-24	8-22		
14	6-12	5-32	6-28	5-9	8-26	9-30		
15	6-13	5-31	6-29	5-8	9-30	10-37		
16	6-14	5-30	6-29	5-7	10-35	11-41		
17	6-14	5-29	6-30	5-7	11-39	..		
18	6-15	5-28	6-31	5-6	..	12-40	a.m.	
19	6-15	5-27	6-31	5-6	12-45	1-36		
20	6-16	5-27	6-32	5-5	1-46	2-30		
21	6-17	5-26	6-32	5-5	2-43	3-26		
22	6-18	5-25	6-33	5-5	3-39	4-19		
23	6-18	5-23	6-33	5-4	4-34	5-16		
24	6-19	5-23	6-34	5-4	5-29	6-11		
25	6-19	5-22	6-34	5-3	6-23	7-5		
26	6-20	5-21	6-35	5-3	7-21	7-59		
27	6-20	5-21	6-35	5-2	8-17	8-49		
28	6-21	5-20	6-36	5-2	9-10	9-37		
29	6-21	5-19	6-36	5-2	10-3	10-21		
30	6-22	5-18	6-37	5-1	10-54	11-1		
31	..	..	6-37	5-1	..	11-33		

Phases of the Moon, Occultations, &c.

3 Apr.	☾ First Quarter	3 56 p.m.
10 "	○ Full Moon	11 38 p.m.
17 "	☾ Last Quarter	2 17 a.m.
25 "	● New Moon	4 38 p.m.

Perigee, 12th April at 9.12 p.m.

Apogee, 28th April at 2.0 p.m.

A daylight spectacle of Mars and the Moon may be obtained on the 7th about 1 p.m., when Mars will be 3 degrees from the Moon, northward; they will then be in the west-north-west. On the next day, about 2 p.m., Jupiter may be seen somewhat nearer to the Moon, which will then be rather brighter.

Observers may have noticed that Mars and Jupiter have been apparently moving westward—Jupiter since 17th January; Mars since 24th January. Mars will be stationary on 13th April, and resume direct motion on 16th April, and Jupiter on 19th May, the two planets apparently meeting on 4th June.

Uranus will be on the far side of its orbit, in a line with the Sun, and at its greatest distance from the Earth—1,874,834,000 miles—on the 13th.

Venus is also drawing very near to the Sun, with which it will be in superior conjunction on the 21st.

On the 20th Mercury will be at its greatest western elongation, 27 degrees west of the Sun, apparently amongst the small stars of Pisces, 3 degrees eastward of the first point of Aries.

On the 25th Venus and the Moon will be in conjunction, or, rather, a distance of 6 degrees will separate them, about midday, but the Moon being new, they will be entirely lost in the Sun's rays.

The path of the Moon during the month will be:—In Taurus on the 1st, in Gemini 2nd and 3rd, in Cancer 4th and 5th, in Leo 6th, 7th, and 8th, in Virgo 9th, 10th, and 11th, in Libra 12th, in Scorpio 13th, in Orphicinus 14th, in Sagittarius 15th and 16th, in Capricornus 17th, 18th, and 19th, in Aquarius 20th, in Pisces 21st, 22nd, 23rd, and 24th, in Aries 25th, again in Taurus 26th, 27th, 28th, and 29th, and in Gemini on the 30th.

Mercury rises at 4.57 a.m. on the 1st, and at 4.9 a.m. on the 15th.

Venus rises at 5.41 a.m. (24 min. before the Sun) on the 1st, and at 6.3 a.m. (8 min. before the Sun) on the 15th.

Mars rises at 4.5 p.m. and sets at 3.8 a.m. on the 1st; on the 15th it rises at 3.5 p.m., and sets at 2.11 a.m.

Jupiter rises at 4.40 p.m. and sets at 4.10 a.m. on the 1st; on the 15th it rises at 3.40 p.m. and sets at 3.10 a.m.

3 May	☾ First Quarter	8 39 a.m.
10 "	○ Full Moon	8 4 a.m.
16 "	☾ Last Quarter	10 50 p.m.
24 "	● New Moon	8 7 p.m.

Perigee, 11th May, at 3.42 a.m.

Apogee, 25th May, at 9.12 p.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 23 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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